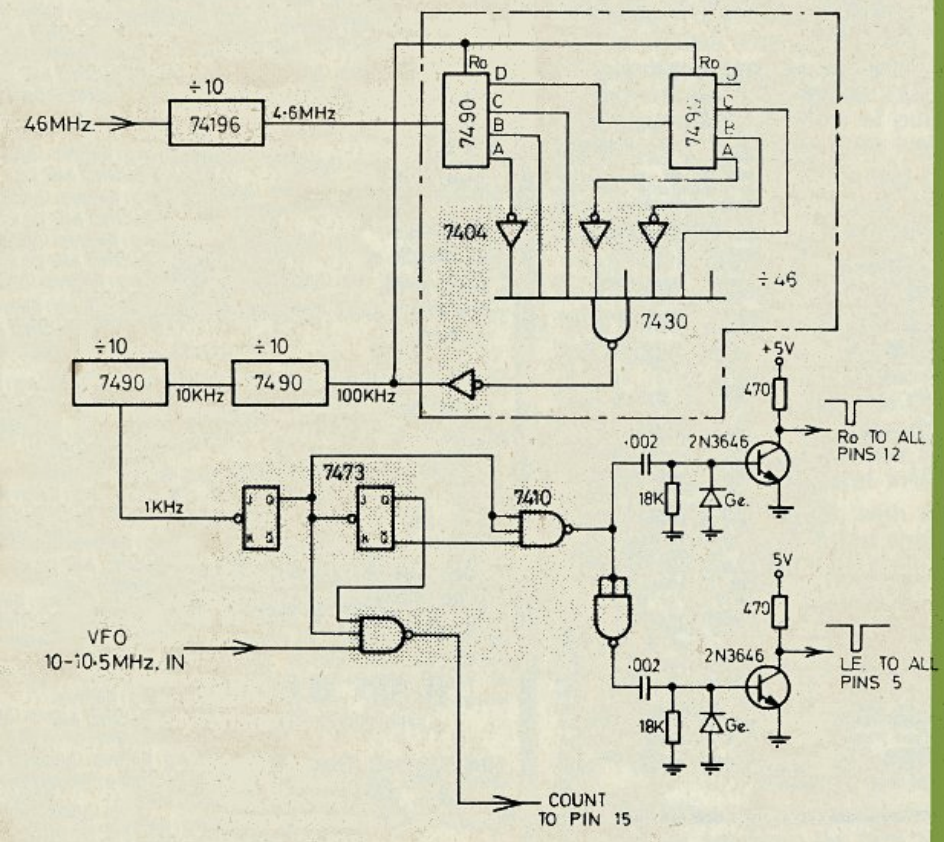
amateur radio

OCTOBER, 1974



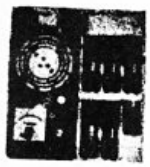
CIRCUIT SCHEMATIC

CONTENTS

FRONT COVER: Schematic diagram of the logic circuitry for digital readout for an SSB transceiver. Coming shortly in AR

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

GRID DIP METER
SPECIFICATION **Model TE-15**



Freq. Range: 440kHz-280MHz in 6 Coils
A Coil 0.44—1.3MHz
B Coil 1.3—4.3MHz
C Coil 4.14MHz
D Coil 14.40MHz
F Coil 120-280MHz
Transistor: 3 TR's & 1 Diode
Meter: 500uA Fs.
Battery: 9V (BL-006P)
Dimensions: 180x80x40mm
Weight: 730g

Price $36.50
P & P $1.00

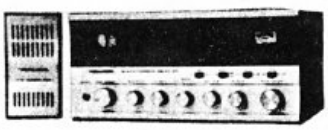
DELUXE AUDIO GENERATOR
SPECIFICATION **Model HE-22D**
Model TE-22D

Freq. Range: Sin: 20Hz-200kHz
Square: 20Hz-25kHz
Output Voltage: Sine: 7 volt.
Square 7 volt
Output Impedance: 1000 ohm
Freq. Accuracy +3% + 2Hz
Distortion: Les than 2%
Tube Complement: 6BM8
12 AT7, 6Z4
Power Source: 105-125, 220-240V AC, 50/60 cps. 19W
With Attenuation Range
4 Ranges—1/1, 1/10, 1/100, 1/1K

Compact-Space Saving.
Printed Circuit for uniform Characteristics.
Low Distortion
Dimensions: 140 x 215 x 170mm
Weight: 2.8kg.

Price $49.50
P & P $2.00

DX150B REALISTIC with SEPARATE SPEAKER



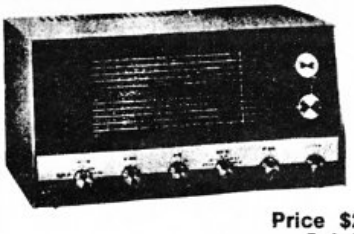
The popular REALISTIC DX150B which has gone from strength to strength with amateurs, short-wave and broadcast listeners alike, now has a further improvement, A SEPARATE MATCHING SPEAKER included.
The DX150B gives long-range, world-wide realistic reception on 4 bands, including Broadcast Fully transistorised-all solid state-no warm-up delays, the DX150B will run on dry cells if current fails or is not available, will operate from a car's cigarette lighter or any 12V DC service. A 240V AC power supply is also built in. Over 30 semi-conductors-product detector for SSB/CW, plus fast and slow AVC-variable pitch BFO-illuminated electrical band-spread, fully calibrated for amateur bands-cascade RF stage-ANL for RF and AF-zener stabilised-OTL audio-illuminated "S" meter.

Price ~~$229.00~~
now price — **$189.00** P & P $2.00

LAFAYETTE HA-600A SOLID STATE
GENERAL COVERAGE

5 BANDS 150-400 kHz, 550-1600 kHz (Broadcast band), 1.6-4.8 MHz, 4.8-14.6 MHz, 10.5-30 MHz.
Operates from 12 Volts DC (negative ground) or 220-240 Volts 50 Hz.

- Field Effect Transistors in RF Mixer and Oscillator Stages.
- Two Mechanical Filters for exceptional selectivity.
- Voltage Regulated with Zener Diodes.
- Product Detector for SSB/CW.
- Edge illuminated Slide Rule Dial with "S" Meter.
- Continuous Electrical Bandspread Calibrated 80-100M Amateur Bands.
- Variable BFO, Automatic Noise Limiter.
- Speaker Impedance: 4 to 16 ohms.



Price $215.00
P & P $2.00

Also available — HA800B Amateur Band. 6 Bands 3.5MHz to 29.7MHz and 50-54MHz as above features with 100kHz calibration **facility: $210.00. 100kHz** Xtal Extra **$10.75.** P & P $2.00

SOLID STATE WIDEBAND RF SIGNAL GENERATOR
MODEL SG-402

This is an all solid state, wide-band RF Signal Generator which produces low impedance low distortion RF signals. It is highly dependable and easy to operate, and is a handy working instrument for service benches and electronic equipment production centres.

SPECIAL FEATURES
1. Generates wide range signals from 100kHz to 30MHz in six frequency ranges.
2. All solid state construction for instant waveforms, compact and lightweight portability.
3. Includes 400Hz signal source for modulation of output signal, which can be modulated by external sources.

Price $99.50. p & p $2.00

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Ericaton Type manufactured by L. M. Ericson. As used by PMG Dept. As new condition. Dial in base. **$19.50** Tested. p&p 75c
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Standard 2 Circuit Phone Plug PMG Type **30c**
PMG Type Counters, 4 digit, 48 Volt operation **50c**
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PMG Type Telephone Extension Bells, 48V **$2.00**
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MODEL CO-1303A
SPECIAL FEATURES

1. Vertical sensitivity of 20 mV/cm, three step attenuation, AC DC operation & wideband frequency response from DC to 1.5MHz.
2. DC vertical and horizontal amplifiers for wide versatility make possible external sweep speeds of less than 1Hz.
3. All solid state construction for compact, lightweight portability.
4. Smoked filter glass CRT face and exclusive designed graticule, graduated in dB for clear waveform comparisons.
5. Direct input to 150MHz for SSB and AM transmission monitoring.

Price $150. p & p $2.00

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6SK7-ECH35-6K8G-5763	$3.00
6SJ7GT-12AT7	$1.50

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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA, FOUNDED 1910

AUGUST, 1974
VOL. 42, No. 8
Price, 50 cents

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QSP

THE WIA YRCS

Maitland Radio Club were hosts to the WIA Youth Radio Clubs Scheme triennial conference over the week-end of August 31st-September 1st.

The YRCS is an activity which ought to involve every member of the Institute. It is not an activity which should gladly be handed over to professionals within the confines of the State educational curriculum. It is an activity requiring the support of amateur operators.

In considering the YRCS it must be remembered that so many of us entered the ranks of amateurs through some interest kindled in our younger days. It should also be remember that YRCS exposes the youngster to amateur radio amongst other subjects. Many fall by the wayside. Some get through to a licence.

Today the day-to-day exposure of a youngster to amateur radio is probably less than ever before. The development of SSB has assisted in this decline. The ready availability of other sports and pastimes, broadcast-band transistor radios, pre-occupation with the television and the relative paucity of publicity on amateur radio have all conspired to keep our hobby so little known.

Here is YRCS exposing the young to amateur radio. It is an Institute-supported activity operated mainly by amateurs as a band of dedicated people. It needs more support both in people and finances.

Their 1974 Conference dealt in great depth with a standardised syllabus and allied subjects relative to various grades of intake and progression.

The kind of study material and the provision of certificates all were examined. In most instances the availability of finance was a limiting factor. The conference also received with regret the resignation of Mr. R. Black VK2YA as the Chairman of the Syllabus Committee and expressed thanks for his work for the Scheme. Rev. Guthberlet and Jack Flynn were re-nominated for a further term as Federal YRCS Co-ordinator and Federal YRCS Secretary respectively.

Let us hope the YRCS, with our help, will advance from strength to strength. Let us remember that our work on training the youth of today in electronics and amateur radio activities must count in the ultimate question at the next WARC in 1979 "of what value is amateur radio to the community."

A. G. MULCAHY, VK2ACV
VK2 President &
Federal Councillor.

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P.O. Box 150, Toorak, Vic., 3142

SCOUTING

Please do not forget the 1974 17th J.O.T.A. 19th/20th October. The Australian Scout net is now on the first Sunday of each month on 7070 kHz from 0930h to 10.30h and on 14290 kHz thereafter to 13.00h E.A.S.T. — net control VK4QH. The Asia Scout net is on 14290 kHz Thursdays 11.30 hZ.

LICENSING DELAY IN VK3

If you have passed the Examinations and have made application in Victoria for a licence (or if you want a change in call sign or wish to reserve a call sign) you must expect to face a normal delay of about three weeks before getting your licence — assuming all the paperwork is in order. Remember that for any of these things you have to write in. Telephone applications are not accepted. You will get notification of all call sign allocations only via the issue of the licence. Letter VR4/4/5 of 6.6.1974 refers.

SEANET CONVENTION

Mr. Carlos M. Tryes DU1CMT, President of PARA, writes to advise that the 1974 SEANET Convention will be held in Manilla on November 8th/9th. Anyone wanting reservations, etc., please write to Mr. James G. Ong DU1JO, P.O. Box 386, MCC Makati, Philippines.

Lloyd's Accumatic™ 999 Pocket Slide-Rule Calculator

$108·50

with case and alkaline batteries

optional extra:

set of rechargeable batteries and charger **$9.50**

(plus sales tax if applicable)

discount for 5 or more units.

The new Lloyd's Accumatic 999 is like having an "electronic slide-rule" at your fingertips—only *better* because it does even more than a slide-rule! And it's faster too. The Accumatic 999 can solve a complex scientific problem with split-second accuracy. It's really the perfect calculator value for the scientist, engineer, mathematician, accountant, banker, teacher, architect, or *any* math-using professional.

The Accumatic 999 puts all these capabilities in the palm of your hand:

▲ TRIGONOMETRIC FUNCTIONS IN DEGREES OR RADIANS Besides performing all common arithmetic functions (addition, subtraction, multiplication and division), the Accumatic 999 can instantly give you the sine, cosine, or tangent of any angle, as well as the inverse of any of these functions (i.e. arc sine, etc.). And an exclusive degree/radian conversion switch allows you to compute in radians as well as degrees – a feature unavailable on most other slide-rule calculators.

▲ EXPONENTIAL FUNCTIONS Natural logarithms (ln x), natural antilogarithms (e^x), common logarithms (log x), common antilogarithms (10^x), square roots ($\sqrt{x}$), reciprocals ($\frac{1}{x}$), and powers of numbers (x^y) are all easily computed on the Accumatic 999 at the touch of a button.

▲ FULLY ADDRESSABLE MEMORY BANK In addition to its "display" register and its separate "constant" register, the Accumatic 999 has a fully addressable memory bank that is the most advanced available to date. An (m + x^2) key automatically squares a number and enters it into memory – very handy for finding the hypotenuse of a right triangle when the other 2 sides are known. It also has 5 additional memory keys to perform other memory functions.

▲ EIGHT-DIGIT DIGITRON® DISPLAY A brilliant 8-digit Digitron display is located at the top of the calculator. This patented display is actually *brighter* and superior in legibility to the light emitting diodes (LED's) found on many other calculators. The display also contains an overflow (error) indicator as well as a negative number (minus) indicator. The wrap-around decimal feature enables calculations to proceed even when answers exceed 8-digits.

▲ OTHER SPECIAL FUNCTIONS Other important function keys on the Accumatic 999 include: Pi (π) key; a multi-purpose Clear (C) key; Data Recovery (DR) key; and Change Sign (+/−) key. And in addition to performing basic geometric, trigonometric and logarithmic functions, the Accumatic 999 is capable of executing certain other advanced operations, including quadratic equations, hyperbolic and inverse hyperbolic functions, and polar to rectangular transformations. In the field of business and finance, the Accumatic 999 can compute: compound interest, present value, and mortgage amortization. In statistics: mean and standard deviation and chi squared evaluation. In electronics: charge on a capacitor and admittance problems. There's no end to the Accumatic 999's versatikty!

Compare The Accumatic 999 To These Other Leading Slide-Rule Calculators!

DESCRIPTION	T.I. SR10	MECH. SLIDE RULE	HEWLETT PACKARD HP35	LLOYD'S E999 SLIDE RULE
Multiply (X)	YES	YES	YES	YES
Divide (÷)	YES	YES	YES	YES
Square (x^2)	YES	YES	YES	YES
Reciprocal ($\frac{1}{x}$)	YES	NO	YES	YES
Square Root ($\sqrt{x}$)	YES	YES	YES	YES
Change Sign (+/−)	YES	NO	YES	YES
Add (+)	YES	NO	YES	YES
Subtract (−)	YES	NO	YES	YES
Scientific ($X10^{xx}$) Notation	YES	NO	YES	NO
No. of Digits Readable	8	3	10	8
Pi (π)	NO	YES	YES	YES
Exponent (x^y)	NO	NO	YES	YES
Natural (Ln x) Logarithm	NO	YES	YES	YES
Natural (e^x) Antilogarithm	NO	YES	YES	YES
Common (Log x) Logarithm	NO	YES	YES	YES
Common (10^x) Antilogarithm	NO	YES	NO	YES
Trig. Functions	NO	YES	YES	YES
Memory	NO	NO	1+Stack	$1+x\rightarrow m$ 2 $x\rightarrow m$
Radians/Degrees	NO	NO	NO	YES
Display Recall	NO	NO	NO	YES

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Easily Settable Counters
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1 Hz Square Wave Output Available
Alternating Displays Time, Date and Month
Continuous Operation during AC Power Failure
Direct Interfacing to Fluorescent Display
ON Chip Display Oscillator

Price: **$15.00** Sales Tax Exempt, **$17.25** Sales Tax Paid.

6-DIGIT FLUORESCENT CLOCK DISPLAY

This multiplexed Display interfaces directly to the above Clock chip, Colour Blue-Green.

Price with Socket **$13.00** Sales Tax Exempt, **$14.95** Sales Tax Paid.

AUTO CLOCK IC MM5378

Crystal Controlled Oscillator driven directly by the Chip, typical power supply current 3mA.

Power Supply Voltage 9-20V DC.
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The following frequencies are available on one Board at Crystal Accuracy:
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Power Requirement 5V DC. Ideal for Frequency Meters or Digital Stopwatches.

Price: **$28.50** Sales Tax Exempt,
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8038 FUNCTION GENERATOR IC

GENERAL DESCRIPTION:

The 8038 Waveform Generator is a 14 pin monolithic integrated circuit, capable of producing Sine, Square, Triangular, Sawtooth and Pulse Waveform of high accuracy with a minimum of external components. The frequency can be selected externally over a range from less than 0.001 Hz to more than 1 MHz and is highly stable over a wide temperature and supply voltage range. Frequency Modulation and Sweeping can be accomplished with an external voltage and the frequency can be programmed digitally.

Price: **$5.25** Sales Tax Exempt, **$6.04** Sales Tax Paid, 20 page application Notes **50c.**

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PUSH-BUTTON SWITCHES
LIQUID CRYSTAL PRODUCTS
MOLEX IC SOCKETS
10 turn POTENTIOMETERS
INTEGRATED CIRCUIT TESTERS
PANEL METERS
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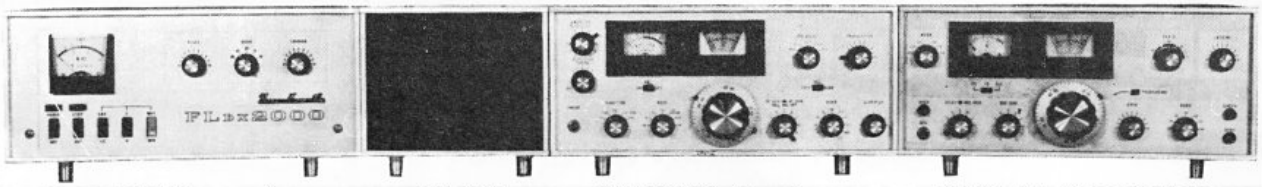

FL-2000B Linear Amp. 80 - 10 mx, G.G.

SP-400 Speaker

FRDX-400 Receiver 160-10 mx, WWV, C.B.

FLDX-400 Transmitter 80 - 10 mx, peak in. 300w.

FTDX-401 TRANSCEIVER: 80/10 mx, PA two x 6KD6, 560w. peak input SSB, choice of manual, PTT or VOX operation. Full coverage on 10 mx, offset tuning, calibrator. Includes fan, CW filter, noise blanker, **$595.**

FT-101B TRANSCEIVER: 160/10mx, SSB, AM, CW, PA two x 6JS6C, 300w. peak input SSB. Built-in dual AC/DC power supply. Low current drain transistorised except for transmitter driver and PA. I.F. noise blanker, fan, FET receiver RF, clarifier, built-in speaker. Ideal for portable/mobile from 12v. DC, or in the shack on AC, **$598.**

FT-200 TRANSCEIVER: 80/10 mx, PA two x 6JS6C, 300w. peak input SSB. Manual, PTT or VOX control, offset tuning, calibrator. Operates from a separate power supply, **$331 FP-200:** Yaesu AC Power Supply for FT-200, in matching cabinet with in-built speaker, **$90.**

FT-75B TRANSCEIVER: SSB and CW. VXO, noise blanker, squelch. Very small size, transistorised, a superb little rig 80w PEP. Microphone and four crystals included, **$249.**

FP-75B AC POWER SUPPLY: 230v., for FT-75B Built-in speaker, power cable and plug, **$60.00.**

DC-75B DC POWER SUPPLY: 12v., for FT-75B. Includes built-in speaker, mobile mount, power cable and plug, **$75.**

FL-101 TRANSMITTER: Solid state 160 - 10 m, PA two 6JS6C, all facilities. Companion unit to FR-101, **$459.**

FR-101D RECEIVER: All solid state, 23 bands inc. all amateur bands 160/10m plus 6 & 2m, FM, CW, etc. etc.! **$620.**

FT-501 DIGITAL READ-OUT TRANSCEIVER: 80-10mx, SSB CW. 500w peak input, includes 2-speed cooling fan, noise blanker, clarifier, VOX and etc. Inc. matching AC PS, **$788.**

FL-2000B LINEAR AMPLIFIER: 80-10 mx. Tubes, two x 572B triodes in G.G., twin fan cooled, **$398.**

FL-2100B LINEAR AMPLIFIER: Similar to FL-2000B but styled to match FT-101B, **$398.**

FT-620 SIX METRE SSB AM, CW, TRANSCEIVER: 10w solid state, **$368.**

S200R TWO METRE SYNTHESISED FM TRANSCEIVER: 200 channels, 10 W solid state, **$385.**

FVT-650 SIX METRE TRANSVERTER: Converts 28 MHz. SSB to VHF, and includes receiving converter. Primarily designed for coupling with Yaesu models FL/FR-101, FTDX-401, FT-200, FT-101, with simple installation requirements, **$175.**

FT-2FB TWO METRE FM TRANSCEIVER: 10w., fully solid state, with mic. and power cable, inc. Ch. B, 1 & 4, **$198.**

FT-224 TWO METRE FM TRANSCEIVER: 10 W, 24 channels, new model, **$250.**

FP-2AC AC POWER SUPPLY for FT-2FB, FT-224 and S200R, includes speaker and battery charger, **$59.**

FT-2AUTO FM TRANSCEIVER: Similar to FT-2FB but with addition of automatic scanning facility, etc., **$345.**

YC-355D FREQUENCY COUNTER: 200 MHz, **$298.**

YC-355: Similar to YC-355D but reads to 30 MHz, **$258.**

YO-100 MONITORSCOPE: Matches other Yaesu Equipment, **$169.**

FF-50DX three-section LOW PASS FILTER for TVI reduction. **$22.**

MATCHING EXTERNAL SPEAKERS for FTDX-401, FRDX-400 or FT-101, **$29.50.**

MATCHING VFOs: FV401, FV-101B, FV-200, each $115.00. FV-50C (for FT-75), $59.

YD-844 DESK MICROPHONE: Yaesu De Luxe PTT Dynamic type with stand. PTT switch, and PTT is actuated when lifted from deck, **$39.50.**

Hand-held PTT **DYNAMIC MICROPHONE, $16.50.**

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S.A.	FARMERS RADIO PTY. LTD., 257 Angas Street, Adelaide, 5000	Ph	23 1268
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QSP – YRCS Convention

ADDRESS BY THE FEDERAL PRESIDENT, DR. DAVID WARDLAW, VK3ADW

I had been hoping to attend the Conference this year but I fear that family commitments for the holiday season made me feel that I must devote some time to them. Those of us who try and give some service to our leisure activities sooner or later find that our families are also entitled to our attention. So please accept my apologies for non-attendance but I am sure that you will receive equally as expert guidance, if not better, from Mr. Tony Mulcahy, the President of the NSW Division.

In this day and age the amateur radio operator is beset by as many problems, if not more, than in his father's day. Dad did not have colour television over his head. He could play with towers and not worry too much about Town Planners' laws. He could use full power without fear of getting into the transistorised front-ends in his neighbourhood. He could even pursue his hobby without the newspapers condemning him as a public nuisance.

We are in a world where a vast amount of additional knowledge is essential if we are to live in harmony with our neighbours. If we are to regain acceptance as a beneficial activity useful to the community we must all act as responsible people of sound behaviour, jealous of our hobby and ever keen to publicise its merits. We are under constant scrutiny not solely by our licensing authority.

In 1979 there is to be a World Administrative Radio Conference at which every frequency allocation will be examined under an electron microscope. The world's top amateur radio experts all agree at present that the outlook for amateur radio at that conference is gloomy.

Amateur radio cannot exist without frequencies. We have only five years to do something useful and constructive to demonstrate that amateur radio is worthy of retaining the frequencies we now have, never mind any hopes of getting more.

In common with other Societies in the IARU we are giving these matters very careful thought. We can legitimately point to our work in emergencies and preparedness through our WICEN activities. We can proudly point to our work with satellite operations. We can make much of our work in training youth for electronics and, in the process, demonstrating that amateur radio is a potent force in retaining interest in what could otherwise be rather a dry subject.

This is an area where the WIA YRCS movement possesses an importance vital to amateur radio as a whole. We need an expansion of YRCS activities. This is a field which should have much more support from amateurs throughout Australia. We must get through to the youth of today in every way we can. Through YRCS. Through Jamboree on the Air with Scout groups. Through active promotion by WIA members to every school and youth group we can reach.

This is my message for you today and the message which will be publicised in the pages of our journal "Amateur Radio" and whenever we can through the media. I wish you success in the conference hall.

ADDRESS BY THE FEDERAL YRCS CO-ORDINATOR, THE REV. BOB GUTHBERLET

As a preface to this address I would emphasize that YRCS is a voluntary organisation, served by voluntary workers, and used by young persons who are free to participate in the Scheme, and free to reject it. I would also emphasize that within the ranks of those who give time and substance to the fulfilment of its aims there is a diversity of talent and a variety of service, without which the Scheme would fail.

When the Scheme was inaugurated, the state of society and the attitudes of young people were totally different from the pattern which we are seeing in this present day. The revolt by youth is such that like many organisations serving the younger generation, YRCS is experiencing a decline in overall membership, although it must be acknowledged that many former club members are now adults, some of whom have found their vocation, thanks to our training, in the various industries associated with Electronics. Many former members are licensed amateurs, and in this sense they are not lost to us but have fulfilled some of our hopes and plans.

I do not subscribe to the negative outlook that the decline in membership is a sign of the slow demise of the Scheme, rather I see it as the present tendency for some young persons to break away, not only from organisations directed by adults, but also from the restrictions of home-life and discipline. This movement by youth is not confined to YRCS — it is a world problem. Indeed, if it were not for the fact that governments decree that every child shall have a formal education, there would be many children, who by personal choice, would become absentee pupils or drop-outs!

Because of changing standards, new discoveries and demands, education has become so involved that any attempt to complicate our curriculum from the 'hobby angle' to the sheer 'professional' basis of education will bring about a serious decline in voluntary instructors, many of whom sacrifice much time and effort to promote the basic requirements of our aims and objectives. By this I do not suggest that we should lower our standards. We need the professional approach to our system of education in YRCS provided that such is offered in terms which can be understood and used by non-professionals.

When YRCS started it was solely under the control of State Divisions, upon whom we continue

The conference will be officially opened by the Mayor of Maitland, Ald. N. Unicomb, at 11 am Saturday.

Patron of the club, Dr. R. H. K. McKerihan, will also officiate at the opening.

The conference will continue all day Saturday, Saturday night and Sunday morning.

Visitors from near and far

Some people will travel from widely separated parts of Australia to attend the conference in Maitland.

They will include—

- Federal Manager of the Wireless Institute of Australia, Mr. P. Dodd, of Melbourne.
- Federal Co-ordinator of the YRCS, the Rev. Robert Guthberlet of Kadina, South Australia.
- Federal and State Secretary, Mr. J. Flynn of Sydney.
- President of the Wireless Institute of Australia (NSW Division), Mr. A. Mulchay of Sydney and Mr. Don Miller of Sydney.
- YRCS Correspondence Supervisor, Mr. W. Tremewen of Ferntree Gully, Victoria.
- State Supervisor for Tasmania, Mr. R. Emmett of West Launceston.
- State Supervisor for South Australia, Mr. A. Dunn of Adelaide.
- State Supervisor for Victoria, Bro. F. Whitton and Assistant State Supervisor, Mr. D. Titford of St. John's College, Braybrook.
- State Supervisor for NSW, Mr. K. Watson of East Maitland.
- Mayor of Maitland Ald. N. Unicomb, and club patron, Dr. R. H. K. McKerihan.

Mr. Mulchay and Mr. Miller will chair sessions of the conference.

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to rely for guidance and support; also the Federal WIA has encouraged and fostered our efforts. In order to achieve some degree of maturity, we have endeavoured to formulate policies and guide-lines to achieve self-support, and although our constitution may be inferior in terms of documentation, it is a basis upon which something better can be drafted.

With constitutional matters in mind, I would urge supervisors whose State committees do not have a constitution, to have such framed in terms of local WIA Divisional requirements and relevant to Australia-wide YRCS uniformity.

Novice Licensing remains incomplete, and although we have made provision for its inclusion in our syllabus programme, a matter of concern has been raised by several YRCS leaders that the topic-list for Novices goes far along the subjects required for the AOCP theory course. This theory structure could encourage candidates to by-pass the Novice Licence and with a little extra knowledge to sit for the AOCP. Should this occur, it could neutralize the aims of the Novice Licence.

To conclude, I would express my thanks to the Executive of the WIA, State Divisions, and to a faithful and efficient YRCS Federal Secretary; to the State Supervisors, and through them to the officers and instructors in the individual clubs for the unstinting manner in which they have performed their duties.

The WIA-YRCS will continue to serve the youth of Australia, providing for them a useful and interesting hobby, an outlet for life's vocation, and the opportunity to enjoy social activities, all of which will befit them to take their places in the future life of the Nation.

For ourselves, the task is to return to our respective areas of responsibility with greater enthusiasm, to keep the lines of communication open between ourselves and club leaders, to publicize the Scheme, and to guide, advise, and wherever possible, to improve the standards and methods of efficiency and thereby increase our membership. ●

"CITIZENS BAND" — CORRESPONDENCE

The Hon. Post Master General, 16th July, 1974
Parliament House,
CANBERRA, A.C.T. 2600

Dear Sir,

Reference is made to a circular, copy attached, put about by a group labelling themselves "Australian Citizen's Radio Movement".

The Wireless Institute of Australia opposes any and all steps designed to establish a radio communication service for or on behalf of unqualified persons under uncontrolled conditions.

The Institute is aware of the activities of pirates both in the 11 metre band and elsewhere and has consistently pressed for firm action by every possible means to be taken against these law-breakers.

At the same time the Institute recognises that some inducement should be provided for such persons to qualify themselves in a comparatively elementary manner to achieve entry into the amateur service as a first step towards more advanced levels. Consequently, in conjunction with the Controller, Regulatory and Licensing of the Radio Branch, a system of Novice Licensing was devised and agreed. It is regrettable to observe that these proposals appear to have been deferred or abandoned.

Furthermore the Institute wishes to direct attention to two additional considerations, namely the conservation of the frequency spectrum and the disrepute of the "Citizens Band" radio in certain overseas countries where it is authorised.

The frequency spectrum is a limited natural resource which is well known to be under intense pressure caused by overcrowding of the stations and increasing demands for additional services. The creation in Region 3 of a new service could be achieved only by the reduction of frequencies already allocated to another service. The 11 M band 26.96 MHz to 27.23 MHz is allocated in this Region to radio amateurs on a shared basis with ISM services, with radio control of model aircraft and similar services. These services enjoy frequency allocations exceeding those granted to the amateur services therein.

In the USA, the pioneer of "Citizens Band" operations, the CB band is almost identical in width to the Region 3 amateur allocation. Since the CB service is known to embrace nearly one million licensees and an unknown number of unlicensed operators the world market is naturally geared to produce suitable equipment for these massive numbers, surpluses are therefore available for sale in other countries. It would be natural to expect that the protagonists of establishing a CB-type service in Australia would automatically select this band.

Reports reaching the Institute appear to indicate that CB operations in the USA are now so extensive that very little control can be exercised over them. Unlike the amateur and many other services which are largely self-policeing, the CB-ers (and pirates) are known to exercise scarcely any control over their own activities. If licensing authorities cannot be provided with adequate staff to exercise continuous monitoring, warning and prosecution services in all places where CB-ers are likely to be active it is believed that the terms of any CB permits or licenses would soon be grossly exceeded both in respect to power limitations and to forbidden subjects, language or comment.

The Wireless Institute of Australia trusts that this brief review of "CB" activities serves to alert all authorities to some of the severe dangers inherent in legalising this kind of radio communication. There would be little necessity therefore to comment upon the alternatives such as the use of the telephone and similar public services, the aspects of safety relating to the use of electrical apparatus and the fear of potentially-great interference to other services and facilities.

Yours faithfully,
P. B. Dodd, Secretary. ●

AUSTRALIA

315/1/63

POSTMASTER GENERAL
CANBERRA, A.C.T. 2600

13 AUG 1974

Dear Mr. Dodd,

I refer to your letter of 16th July, 1974, in which you outline the views of your Institute on the question of the operation of a citizens band radio service in Australia and on the activities of the group styling itself the "Australian Citizens Radio Movement".

As you know my Department, in keeping with your views on the matter, has been firm in its opinion over the years, based largely on the experiences of overseas countries, that it would not be in the public interest to amend the licensing rules to provide for the operation of a citizens radio service in this country.

The operation of illegal stations as mentioned in the circular which you forwarded could not be condoned even though, in isolated circumstances, they may have assisted in rescue operations.

Apart from the steps which are being taken to tighten the control over the operation of such radio services in this country, it is considered that the introduction of the proposed "Novice" Amateur licences will help to alleviate the problem by providing an easier means of entry for interested persons into the Amateur service.

The introduction of "Novice" Amateur station licences was agreed to some time ago and it is now merely a question of the necessary amendments being made to the Wireless Telegraphy Regulations. I can assure you that there is no intention to abandon the proposal.

I would like to thank you for your interest in this matter and for the information which you furnished which I believe will be most useful.

Yours sincerely

(R. BISHOP)

Mr. P.B. Dodd,
Secretary,
The Wireless Institute of Australia,
P.O. Box 150,
TOORAK, Vic., 3142

VHF-UHF Advisory Committee

70 cm draft band plan

JOHN MARTIN, VK3ZJC
3 Vernal Avenue, Mitcham, 3132

This draft band plan is now offered for comment by all interested amateurs. Please note that this is not a final or "official" plan: it is being circulated for comment only at this stage, and it can be modified. The VHF-UHF Advisory Committee feels that it makes best use of the available spectrum space, but if any individual or group has any suggestion on how the plan could be improved in any respect, please let your opinion be known.
You can't complain of being ignored unless you speak!

1. COMMITTEE ACTIVITIES DURING 1973

The main activities of the Committee during the past year have been:

- the processing of the Band Usage Questionnaires;
- the preparation of a draft band plan for the 420-450 MHz band; and
- the preparation of the Institute's submission to the Independent Enquiry into FM Broadcasting.

Work on the FM submission interrupted progress on the 70 cm. band plan, but this has now been completed and is ready for comment.

2. QUESTIONNAIRES

Much of the time spent by the Committee during the year was devoted to the collating and analysis of the Band Usage Questionnaires. A summary of existing band usage was prepared, the assumption being that any band plan should be based on existing usages wherever possible. Comments and suggestions made in the questionnaires were evaluated, and it was possible to see a general consensus emerging in most areas.

3. EXISTING USAGE OF THE BAND

1. summarises the existing usage of the 420-450 MHz band, as revealed in the questionnaires. Most activity is in the tunable segment (432-433 MHz), and in the ATV segments (425-432 MHz in eastern states, 440 MHz in VK5). There are also some FM nets, mostly on the spot frequencies of 435 and 438 MHz The band 435-438 MHz is allocated to the Amateur Satellite Service, although it is not being used as yet. Apart from the ATV operation in the Adelaide area, there appears to be very little use of the segment 440-450 MHz. There are no unattended beacons or FM repeaters in use, as the PMG does not yet permit these in shared bands.

Activity in the band has increased rapidly in recent years, especially in the fields of ATV and FM nets. A similar increase in SSB activity could be expected, with the forthcoming launch of Oscar 7.

4. DRAFT BAND PLAN

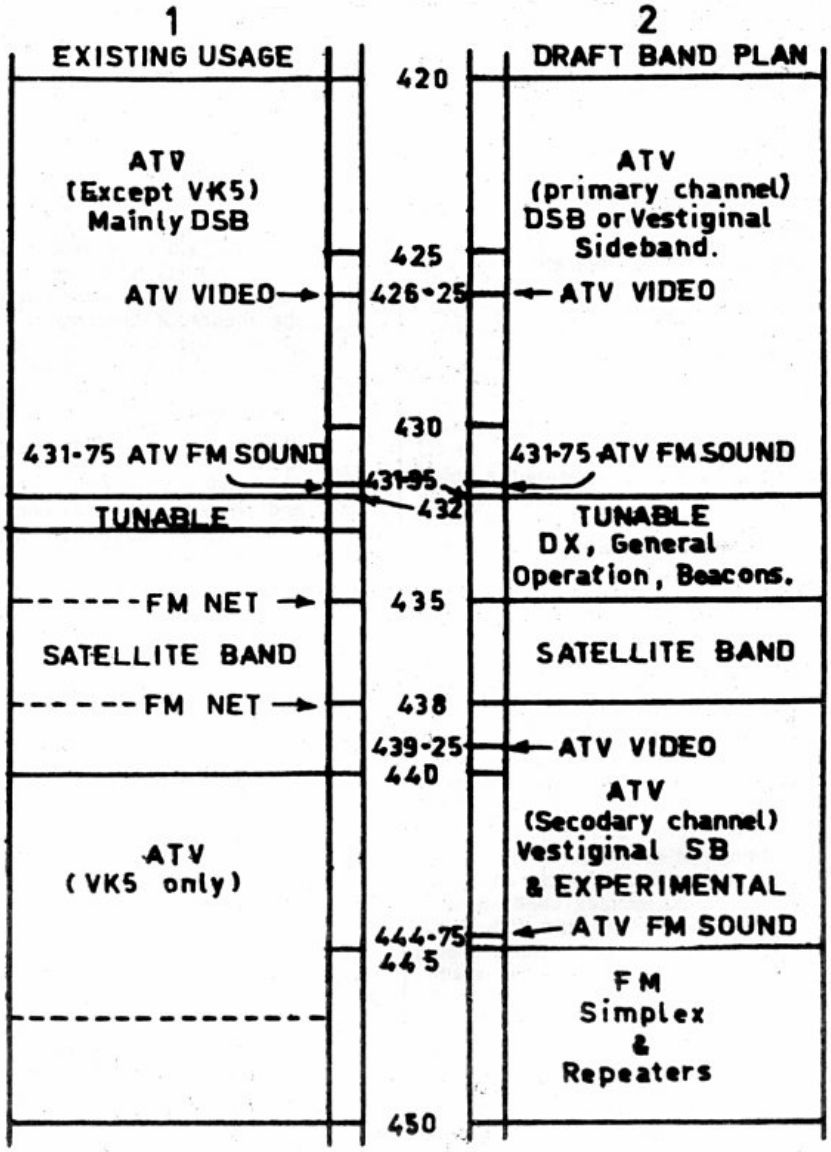
The draft band plan is shown in 2. It conforms in general to existing band usage.

(a) **ATV:** All ATV operation (except in Adelaide) is on or near the national channel established by the Wodonga Conference in 1968 (video carrier 426.25 MHz, intercarrier sound channel 431.75 MHz). This has been allocated as the primary national ATV channel. Since most existing ATV operation is DSB, the segment 420-425 MHz has also been allocated to ATV. With the expected increase in ATV, and the possibility of ATV repeaters, a secondary ATV channel of 438-445 MHz is provided for (video carrier 439.25 MHz, intercarrier sound channel 444.75 MHz). Adelaide ATV stations could transfer to the national channel or use 438-445 MHz as their main channel, as their operation is already very close to this frequency.

Since the lower sideband of ATV transmissions in the secondary channel could possibly interfere with future satellite operations, it is suggested that this channel be used for vestigial sideband transmissions only.

(b) **Tuneable Operation:** The segment 431.95-435.0 MHz is allocated to tunable operation. A 50 kHz segment below 432.0 MHz is reserved for "exotic DX" operation, such as scatter, EME etc., and 432.0-432.05 is set aside for DX working (including "Exotic DX"). General tunable operation is given 432.05-432.75 MHz, for modes such as SSB, AM, CW, NBFM, RTTY and SSTV.

(c) **Beacons:** Since tropospheric propagation is the main mode on this band, it is not essential to locate beacons near "bottom band edge" as on 6 or 2 metres. Most of the comments in the questionnaires favoured an exclusive beacon segment be-



tween 432.5 and 433.0 MHz. The plan provides a segment from 432.75-433.0 MHz for beacons. The concept of a beacon requires that it be as free from interference as possible, and a segment 250 kHz wide is not too large a slice of the band, considering the immense value of beacons.

(d) **General Use:** The remaining part of the tunable segment, 433-435 MHz, is not allocated to any particular purpose at this stage. It could be used for "semi-private" nets, experimental purposes, and possibly for such things as linear translators, in-band or crossband. Most important, it provides space for the future expansion of tunable operation. It was thought that it could be possible to accommodate FM nets here, but the possibility of future repeaters (even though they are not permitted now) arose, and it was felt that a segment only 2 MHz wide would not provide adequate separation between repeater input and output frequencies. Assuming that it would be wise to plan for the possible future establishment of repeaters, and that it would be necessary to have both simplex nets and repeater channels located in the same segment of the band, it was thought best to locate them elsewhere in the band where adequate space could be found.

(e) **Satellite Allocation:** The ITU regulations allocate the band 435-438 MHz to the Amateur Satellite Service. Although it is not yet in use for that purpose, the majority opinion in the questionnaires was that it should be left clear for that purpose, rather than letting a clash arise (as occurred on 2 metres).

(f) **Experimental:** The segment 438-445 MHz has already been mentioned as a secondary ATV channel, but it was also thought necessary to set aside a portion of the band where experimental transmissions could be made without causing interference to normal communications. The band 438-445 MHz is therefore marked "Experimental" as well as "ATV".

(g) **FM Nets:** At first, it appeared a good idea to place the FM nets in the range of 438 MHz and above, on the third harmonics of the 2 metre simplex nets and repeater input frequencies. However, the questionnaires showed that most people who had tried this had problems. Local harmonics from 2 metre stations interfered with their reception, and those using varactor triplers also had 2 metre leakage which interfered with local reception on 2 metres. FM nets and repeaters have therefore been located in the range 445-450 MHz. How these 5 MHz can be used is quite flexible. For example, using 100 kHz channel spacing and 3 MHz input-output spacing for repeaters, there could be 10 repeater channels (inputs and outputs) and up to 30 simplex channels accommodated between 445 and 450 MHz. If 50 kHz channel spacing were used, there could be twice as many of each. Considering the immense popularity of 70 cm. FM in some other countries, it was assumed that there will be considerable expansion in this field in Australia in the near future, and that adequate space should be provided. ●

Amateur Operators Certificate of Proficiency Examinations — August 1974

Through the courtesy and co-operation of the Postmaster General's Department we reproduce the August 1974 AOCP examination papers.

SECTION M (Theory)

(Time allowed — 2½ hours)

NOTE: SEVEN questions only to be attempted. Credit will not be given for more than **SEVEN answers. All questions carry equal marks.**

1 (a) With the aid of a **block** diagram describe the operation of each stage of a single-sideband suppressed-carrier transmiter.

(b) Explain how the transmitted sideband may be changed from upper to lower sideband.

2 (a) Assisted by a circuit diagram describe a variable-frequency-oscillator (V.F.O.) suitable for use in the 7 MHz amteur band.

(b) With reference to a V.F.O., discuss the factors upon which the stability of the generated frequency depends.

3 The antenna coupling network of an amateur transmitter is designed to match an antenna whose impedance lies between 50 and 80 ohms. Assisted by a diagram, describe an antenna which will meet this requirement on at least two amateur bands. Show dimensions and state the frequencies involved.

4 (a) With reference to a radio-frequency amplifier stage, explain under what circumstances neutralisation is necessary.

(b) Aided by a circuit diagram, explain the theory of one method of neutralising a single-ended output stage.

(c) Explain why it is necessary to neutralise a frequency multiplying stage of a transmitter.

5 (a) Describe the manner by which high-frequency radio waves may be propagated over long distances. Explain why communication between countries such as America and Australia is restricted to certain times in the H.F. bands.

(b) Explain why communication over long distances as described in (a) is not possible using the V.H.F. and U.H.F. amateur bands.

6 (a) Discuss features you consider desirable in a microphone which is to be used in a mobile capacity.

(b) With the aid of a sketch describe the construction and theory of operation of a microphone which you consider meets these requirements.

7 (a) With the aid of a sketch show the construction of a cathode-ray-tube and explain the theory of operation.

(b) Show a method of connecting a cathode-ray-oscilloscope to a telephony transmitter to indicate its depth of modulation.

(c) Sketch the pattern obtained when using the connections shown in (b) if the carrier is modulated to a depth of 100%.

8 In relation to a communications receiver explain what is meant by the following terms:
(i) signal-to-noise ratio; (ii) selectivity; (iii) image rejection; (iv) cross modulation; and (v) automatic gain control.

9 (a) Find the total capacity when three capacitors of 3, 6, and 9 microfarads respectively are connected:
(i) in parallel; and (ii) in series.

(b) Calculate the capacitive-reactance of the **series** combination in (a) when connected across a 50 Hertz supply.

SECTION K (Regulations)

(Time allowed — 30 minutes)

NOTE: THREE question only to be attempted. Credit will not be given for more than **THREE answers. All questions carry equal marks.**

1 What action should be taken by an amateur station licensee when informed that transmissions from his station are causing interference to the reception of television or broadcast programmes?

2 State the regulatory requirements concerning the recording and re-transmission of another amateur station's transmissions.

3 (a) State the maximum power which may be used in an amateur radio station using:
(i) amplitude-modulated double-sideband emission (A3);
(ii) single-sideband suppressed-carrier emission (A3J).

(b) Briefly describe the method for determining the peak envelope power of a single-sideband suppressed-carrier transmitter.

4 Give the "Q" code abbreviations for the following:
(i) Shall I send faster?
(ii) The name of my station is .....
(iii) Your signals are fading.
(iv) I have nothing for you.
(v) When will you call me again? ●

A Monitor Scope

Cor Hagoort, VK5YH
16 Gilbert Street, Ingle Farm, 5098

Monitor scopes are still regarded as luxury items by many amateurs. Even by those operating SSB equipment. This perhaps explains why there are many distorted SSB signals on the air.

If we want to adjust our transmitters for optimum working conditions however, a scope is a must. Being a home-brewer I decided to make my own.

The monitor scope that resulted is suitable for monitoring AM, DSB, and SSB, on both receiving and transmitting. There is a choice of either the wave-envelope or the trapezoidal pattern. It has a five position bandswitch which covers the following bands:

Receiver:
1-455 kHz
Transmitter:
2-160 and 80 m
3-40 and 20 m
4-15 and 10 m
5-6 m

A 3BP1 cathode ray tube was used, although a DG 7-5 is to be preferred, because it is physically smaller and the internal electrode connections are shorter.

To obtain sufficient brightness about 800V EHT is needed. A transformer from an old 6V vibrator power supply was used. This transformer has a 300V secondary; the centre-tap was not used, and with a full-wave voltage doubler —840V EHT was obtained.

The HT needed for the EF91 Miller-transitron sawtooth time base generator is taken from the —420V point of the voltage doubler, filtered and reduced to —330V. The anode side of the EF91 has to be grounded to enable the use of this negative voltage.

This system necessitates the use of a 6.3V filament winding which should be left floating. The 6V vibrator primary yielded 8V, which was reduced to 6V by means of a 6.8 ohm 1W resistor.

Flyback suppression is achieved by taking a negative pulse from the screen of the EF91. This pulse is limited by the OA210 and the resulting flat topped waveform fed to the grid of the 3BP1 to blank the retrace of the time base sweep.

Horizontal deflection is controlled by the 1 M linear pot marked "HOR". Vertical deflection is controlled by the 500 pF tuning capacitor. An OA81 germanium diode was used for detection of the horizontal sweep, because there was one in the junk box, but an OA91 would be preferable.

Due to the fact that the horizontal plates D3 and D4 are more voltage sensitive than the vertical plates D1 and D2, the trapezoidal pattern appears slightly pulled out vertically. In practice this does not matter very much.

The trapezoidal pattern can be reversed, by reversing the polarity of the OA81.

Connecting the scope to the receiver and transmitter:

Coaxial cable must be used for these connections.

Receiver:

Connect a 5 pF capacitor from the plate of the last IF tube to the inner conductor of the coax lead.

The monitorscope can be seen on top of Cor's all-band phasing rig.

Transmitter:

Mount a 1 turn loop near the cold end of the PA tank coil and bring the signal out through a piece of coax cable.

Construction hints:

Do not mount the power transformer next to the CR tube. The transformer's magnetic field will influence the electron beam. It is better to mount the transformer behind the CR tube. The layout is not critical. One important point is to mount the 500 pF tuning capacitor with its associated circuitry as close as possible to the 3BP1 base. By keeping the connections between D4 of the 3BP1 and the tuned circuit as short as possible, this monitor scope will work up to 80 MHz.

Preferably the CR tube should be shielded with a mu-metal shield. I must confess to once making a 144 MHz monitor scope using a DG 7-5 without a shield. It worked ok!

Information on the coils in the RF section:

Coil 1 is an IF transformer with one coil shorted. The other coil is used with the fixed capacitor, which is normally soldered across it, removed.

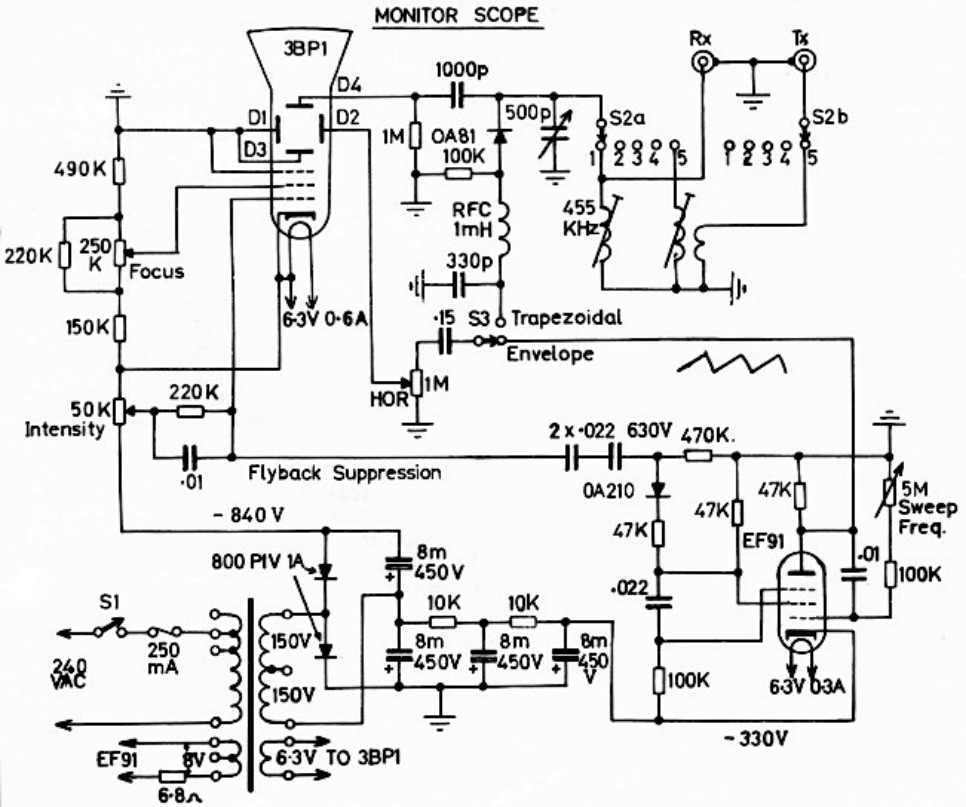
Coils 2, 3, 4 are slug tuned. They are omitted from the circuit diagram for clarity.

Coil 5 is a hairpin loop.

All are link coupled, except the 455 kHz coil.

Note:

If a DG 7-5 or some other CR tube is used, the EHT resistance chain should be altered to supply the correct voltages to the CR tube. ●



Some thoughts on speech processing

Maurie Evered, VK3AVO
13 Sage St., Oakleigh, 3166

The purpose of this article is to discuss some aspects of speech processing and to present the circuit of a speech clipper that has been used successfully at this QTH for many QSOs both local and DX.

Speech processing consists of compression, clipping or a combination of the two. It can be applied to the audio stages before modulation takes place or to the RF signal after side band generation. My comments will be confined to the former where the signal from the microphone is modified, usually through the use of an outboard unit, before it is applied to the transmitter proper.

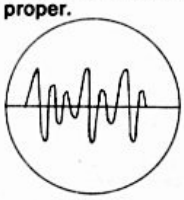


Fig 1A

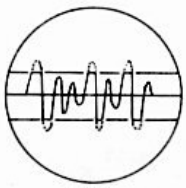


Fig 1B

Speech waveforms normally have a high peak to average value, Fig. 1a, but it is the peaks that determine the "100 per cent modulation" point and if this value is exceeded then the all too obvious distortion and splatter is the result. The amount of audio recovered from an RF signal however is determined by the average value so that if the peak to average value can be lowered, Fig. 1b, a worthwhile increase in signal "punch" can be obtained.

For an excellent discussion of this topic see the ARRL Handbook 1971, p. 258 or QST, January 1969. The only point I wish to emphasize from these texts is the advantage of using audio clipping instead of audio compression. 15 dB of audio clipping gives a 4 dB improvement in the signal to noise ratio of the received signal. Audio compression is useful for maintaining a relatively constant speech level but contributes only 1-2 dB to the signal to noise ratio.

Now to the clipper itself. Like all VK3AVO projects to date the circuitry is not original nor even unusual. It uses an orthodox audio amplifier followed by an orthodox twin triode clipper. This stage clips both positive and negative signal peaks. If run below the clipping level it acts as a low gain amplifier with good distortion characteristics. This clipping stage is followed by a single RC filter to remove the harmonics produced by the clipping process. The circuit requires but few comments—

1. It uses an old fashioned feature, valves. This was done to make it a true "junk box" project and more importantly, that in my experience audio equipment that uses valves is less prone to RF feedback troubles. (I can see the axes falling at a statement like that).

2. Component values are not highly critical in the amplifier stage but I would recommend closely following those in the clipper.

3. V_1a does not use a cathode by-pass capacitor. This "negative feedback" effect resulted in a cleaner output signal.

4. It is wise to include the 100K bleeder resistor in the power supply. The large value electrolytics used to ensure a low hum level can deliver quite a "kick", hours after switchoff.

My particular unit was built on a 6 x 4 x 2 inch chassis and includes the power supply. It is possible of course to "borrow" the necessary power from your transmitter or transceiver. The requirements are very modest.

Now to the most important step of all, adjustment of the unit. It is best to first check with a tape recorder or speaker system so that any distortion or undesirable frequency response can be detected and corrected before any on air tests are performed. If these tests are satisfactory you are set for the real test under operating conditions. If a CRO is available then —

1. With the clipper "out" adjust the mike gain on the rig for normal output without flat topping with normal speech input. A prolonged "h-e-l-l-o" gives the desired effect.

2. Switch the clipper into circuit with the clipping and output controls set just high enough to give a readable pattern.

3. Slowly increase the setting of the clipping control till the CRO shows no further increase in output; this shows that the clipping level has been reached.

4. Increase the setting of the output level control until the same output is reached as in 1.

If a CRO is not available you can use the procedure that I used in conjunction with an FT200 —

1. With the clipper "out" adjust mike gain on the rig for normal output, leave it in this position.

2. Switch the meter to the ALC position and note the reading obtained in 1.

3. Switch the clipper into circuit with both controls set low and increase the clipping level until no further increase is obtained in the ALC reading.

4. Increase the output level till the same ALC reading is obtained as in 1.

This procedure will give a considerable increase in the final plate current, so

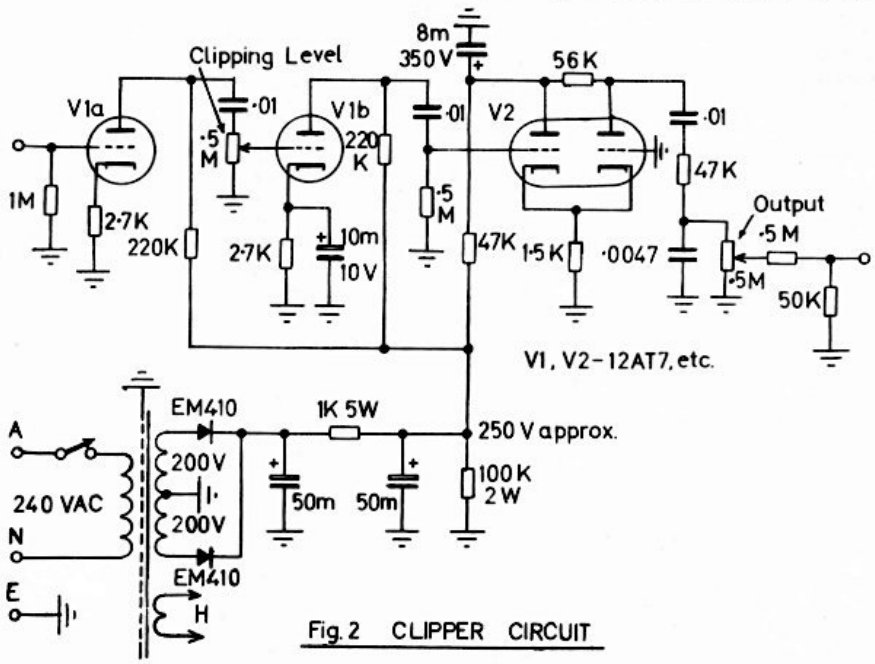


Fig. 2 CLIPPER CIRCUIT

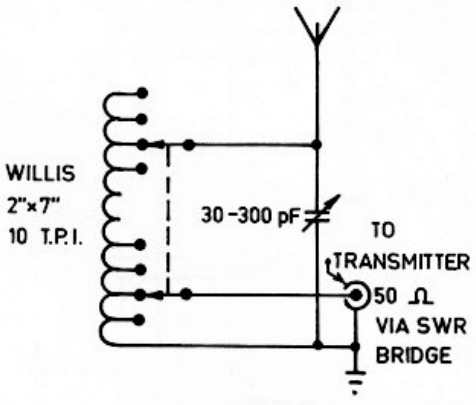
Long Wire Antenna Tuning and Matching unit 80 - 15 metres

D. L. SMITHDALE, VK6DX
12/10 Walter Road, Inglewood, WA 6052
and
H. E. CHRISTENSEN, VK6ZEH
21 Pollard Street, Glendalough, WA 6016

A problem encountered by most apartment-dwelling amateurs is that of radiating a good signal on all bands, without causing TVI, when facilities are available only for a wire antenna of random length. The authors have achieved this very successfully by adaptation of an antenna-tuning circuit previously used by VK6ZEH in commercial installations.

The necessary components were obtained as shown in the figure and the tuner assembled with the exception of the taps from the switches. A point worth mentioning here in construction, is that the coil should be accessible to enable taps to be soldered on at any point around it.

It is essential that a good earth is available. Fortunately, at the 6DX apartment the water system was all copper and its earthing properties good. Adjacent to the apartments was a filling station, with a very convenient tree at the back of the block. Permission was obtained from the flat owners and with the co-operation of the service station proprietor, 125 ft of wire became airborne at around 30 ft up. The length of wire is of no importance, anything more than 30 ft can be made to work on bands 80 m to 15 m. It is essential that the wire is placed in position and the end brought to the point where the tuner will be located. Any subsequent rearrangement will upset the system.



TUNING PROCEDURE

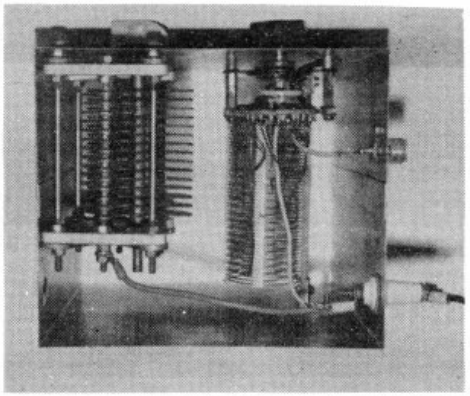
The 80 m band should be adjusted first. Place the capacitor in half mesh, the input tap about 10 turns up from the cold end and the transceiver at midband. Feed a signal from a loosely coupled signal generator and run the top tap down the coil until a maximum S meter reading is obtained, then solder the tap in place. Now place an SWR meter between the transceiver and tuner, using 50 ohm coax. Apply low power from the transceiver and check for minimum SWR. If it is necessary to move the capacitor considerably, recentre and adjust lower tap until the minimum SWR is achieved. This can be done two ways, by switching off, moving, and re-checking, or by holding the lower tap with WELL insulated pliers and running up and down the lower section of the coil until the exact spot is found (WARNING — high voltages can be expected here, proceed with caution). Once the optimum position is found, by a very slight adjustment of the condenser, an SWR of near 1.0 can be had from one end of the band to the other. If this cannot be achieved, select the lowest possible and re-adjust the top tap half a turn either way as necessary to lower the SWR. When operating at the extreme end of the band the SWR should be no more than 1.2 and can be reduced by a slight adjustment of the capacitor.

The remaining bands are tuned in a similar manner. 28 MHz has not been included, as it is felt a suitable separate antenna can be erected and a separate tuner using smaller capacity and inductance constructed.

FEATURES

One of the advantages of the tuner is that it can be adjusted to match any impedance offered by the long wire. It should be noted that in some instances, e.g. the writers' on 20 m, the input tap is above the output tap due to the impedance being less than 50 ohms.

No specific tap positions can be given as they are entirely dependent on the length, height and properties of the antenna. With a little patience, the ultimate can be achieved, all your signal generated being radiated and not wasted heating up the antenna.



The photo clearly shows the construction and the heavy duty components used.

Good construction practices should be followed, using heavy duty switches and variable capacitor. The wiring should be bare copper wire and firm enough not to sag. Plastic covered wire, if touching, and the wrong tap selected for tuning up, will result in fusion of the wires together. The whole assembly should be enclosed in a well bonded and EARTHED metal box. By leaving off the earth the SWR will rise to as much as 2.5 to 1.

The system can be used to match a vertical antenna in the same way. Tests to date have shown the system to work very well, and the comment of DX stations is often of surprise when they hear that the antenna is only a long wire. Working portable in the NW, Europe has been worked with ease using a 60 ft wire 12 ft up and a fair ration of DX using a 125 ft wire 30 ft up. Good DX!

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CONTINUED FROM OPPOSITE PAGE

keep it at a safe level as far as plate dissipation is concerned. Normally there is no reason to increase the level of clipping beyond this setting unless your signal is being received very weakly then you may find it an advantage to increase it slightly but not too much. Too high a level of clipping will produce excessive distortion which **decreases** signal readability and so defeats the whole purpose of speech processing to say nothing of overheating your final tubes. It is this practice of running speech processors, compressors and clippers alike, into the distortion level that has given them a bad reputation with many operators who, quite rightly, cannot tolerate the awful racket.

For further information regarding the theory and practice of speech processing I would suggest, in addition to the two earlier references —

1. RSGB Handbook, 1968, p. 9.25.
2. Radio Communication, January 1973, p. 36.

I will finish with two acknowledgements:

1. Ron VK3OM for several suggestions regarding the circuit, particularly the 10 : 1 attenuator in the output stage. Without this the output control is far too coarse in adjustment.

2. The many operators, both VK and DX, who tolerated my requests for comments on my signal with the clipper in and out of use.

I hope anyone who builds this little unit will find it as useful as I have.

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A Transistorised Receiver for 160 metres.

JIM WALLICH, VK3ANY
154 Balwyn Road, Balwyn, 3103

If your station is adequately equipped for fixed operations and you feel the need for a portable receiver which can be used outside the shack then this article is for you.

It was decided to build a receiver rather than to convert a broadcast band "tranny" as it was considered that the normal cheap transistor portable would lack some essential refinements as well as sensitivity. What was aimed at was a set of such design that could be easily duplicated and therefore was not too complicated and did not require critical adjustment. Sensitivity was to be comparable to any good communication receiver and selectivity to be adequate for present activity in the VK3 area.

With these standards in mind a design which appeared some time ago in a British magazine was used as a basic format. By certain modifications and by leaving out what were regarded as superfluous refinements, an excellent "birds nest" was produced on the bench and in due course this was drawn up and built on a printed circuit board. The final circuit is shown in Fig. 1. Tests carried out by VK3GK were so successful that the design is offered for the consideration of other amateurs.

CIRCUIT DESCRIPTION

Firstly, it was decided to use germanium transistors as a number of these were available and had to be used up. Secondly as an audio strip was also available this was incorporated into the unit although the enterprising builder can readily build his own. The space on the board will easily accommodate one of the audio ICs now available. A little circuit designing is all that is required together with some modification of the PCB. A small (2½ inch) speaker could, it was discovered, be fitted to the board.

As will be seen the circuit follows conventional design. VC1A, VC1B and VC1C are ganged. Additionally, as shown, there is a small peaking capacitor across L3. This was found most useful as it compensates for any poor tracking that may occur when exact component values are not used. This capacitor may be 10 to 15 pF. It has been suggested that VC1A could be separate from the other two tuning capacitors in view of the difficulty and expense that may be encountered in obtaining a 3 gang unit. In practice such an arrangement does leave quite a lot to be desired as when it is off tune it really masks signals and consequently weaker signals may be missed. If a 3 gang cannot be obtained then one may be made up from a 2 gang and a single gang.

The IF transformers came from discarded broadcast receivers and are the small 5 pin type. It will be observed that in the case of IFT1, 3 and 5 the collectors are connected to the tap nearest to the cold end of the primaries. The resistance from tap to coil is about 1 ohm and the resistance from the tap to the other end is 2 to 3 ohms. There are several different configurations for these transformers as shown in figure 3. IFT1 and 5 used in the receiver are type A whilst IFT3 is type B as illustrated. The constructor will have to check this point when selecting his IFTs.

At first sight the AVC circuit may appear very light weight. However it is in fact very effective and no blocking occurs even on the strongest signals. The "S" meter uses a tuning indicator/battery level indicator from an old transistor set. Even when purchased new they are cheaper than ordinary meters; they are small and give a perfectly satisfactory indication of signal strength. The meter is adjusted to read half scale for an S9 signal and zero with no aerial connected. The BFO presented quite some difficulty as it was found that the fourth harmonic of the oscillator came out on 1820 kHz. Eventually a cure was found by tuning the IF transformers to the lowest possible frequency with the aid of a signal generator. This worked out to about 448 kHz. The fourth harmonic of the BFO thus moved to 1792 kHz — below the amateur band. Consequently no screening or special care is required and the BFO works very well. The BFO uses the same type of IFT as the IF except that the resonating capacitor is removed. (Gouged out is the only way I can think of describing the operation.)

The section reserved for the audio strip can be changed to suit the builders own requirements particularly if he makes up his own audio stage. Remember that a screened lead must be taken from VC2 at the front panel to the PCB. The —10 v. supply and earth wire must also be taken to the audio strip and wires run to the speaker from the audio output. The audio strip is fixed to the PCB with nuts and

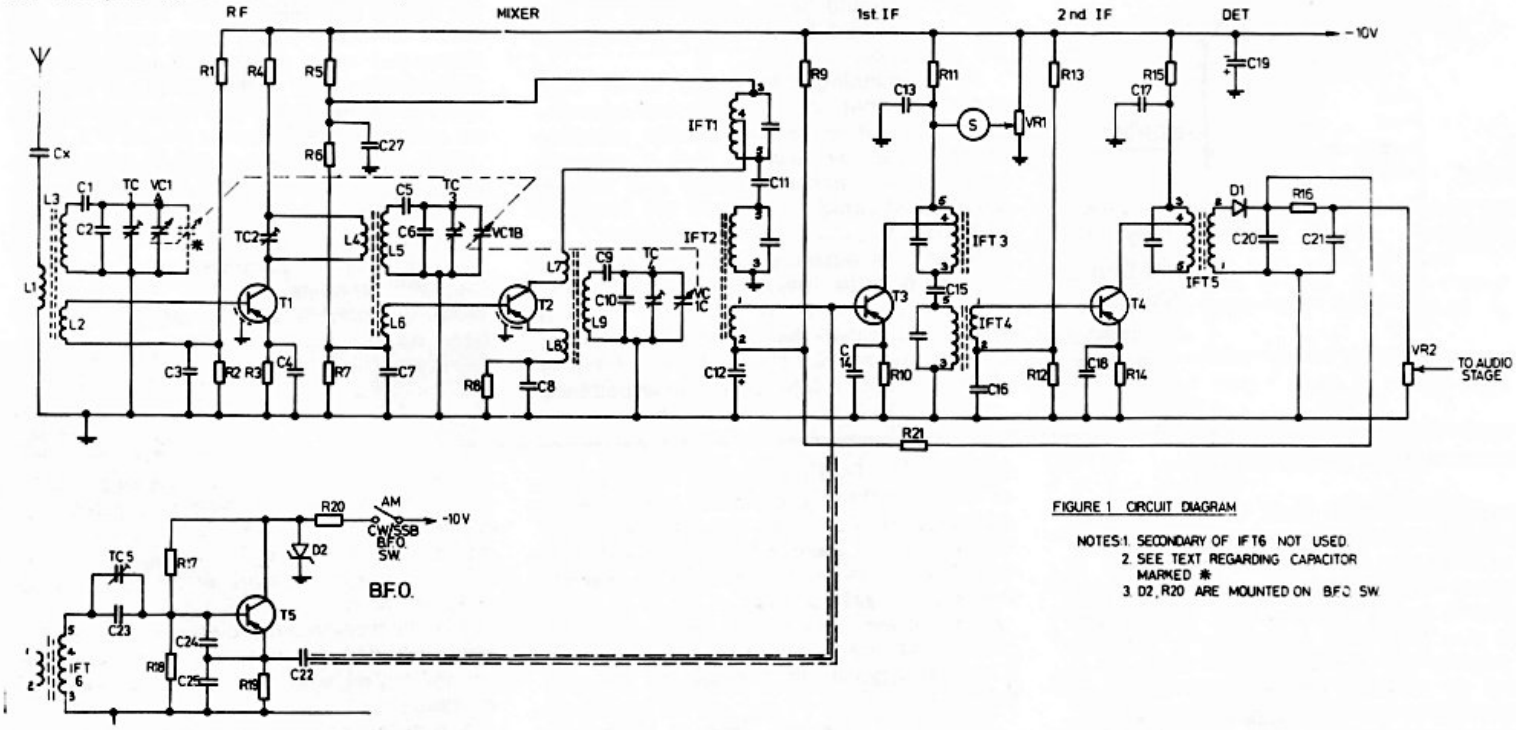
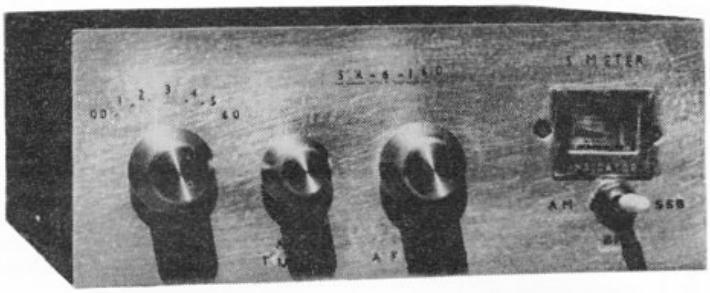
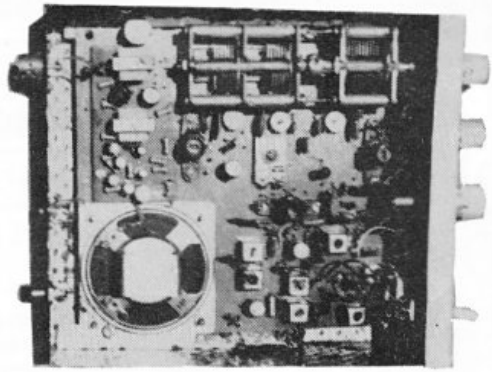


FIGURE 1 CIRCUIT DIAGRAM

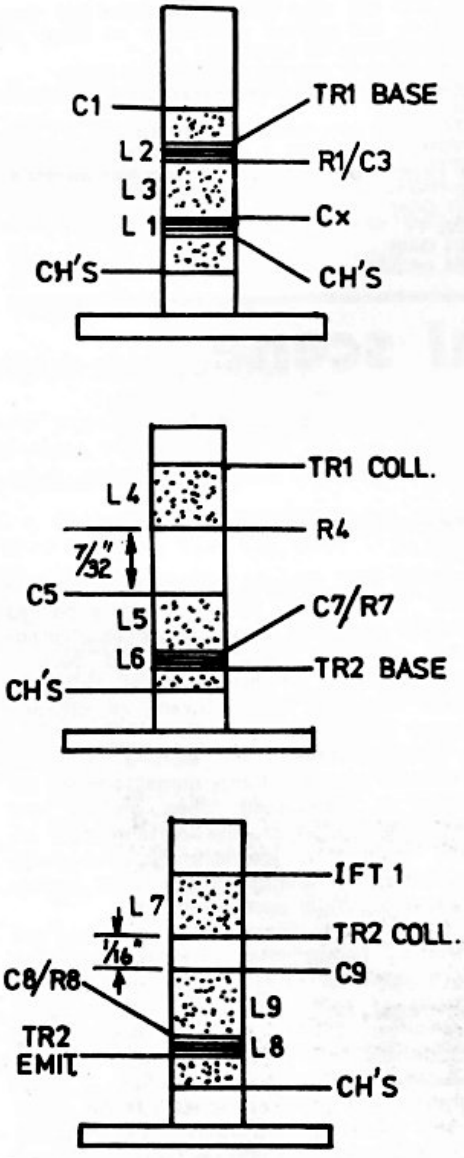
NOTES: 1. SECONDARY OF IFT6 NOT USED.
2. SEE TEXT REGARDING CAPACITOR MARKED *
3. D2, R20 ARE MOUNTED ON B.F.O. SW.



Front view of the completed receiver.



Top view showing placement of major components.



Aladdin 804 Formers. Coil Wire 32 SWG enamelled. L7 10 turns, L8 3 turns, L9 45 turns, L4 25 turns, L5 45 turns, L6 3 turns, L1 3 turns, L2 3 turns, L3 45 turns.

bolts together with spacers. The speaker is mounted on the component side of the board so that when the board is laid copper side down the cone faces downwards.

CONSTRUCTION, ADJUSTMENT AND TUNING

Location of the main components on the PCB is the first step. Obviously a decision has by now been made on the ganged capacitor. Coil formers (Alladin F804) are screwed to the board and the coil terminal pins either passed through holes in the board or soldered to pins as used on veroboard. The construction of the coils is not too critical, however the dimensions should be followed as closely as possible. Above all ensure that the coils are connected properly. TC2 is soldered into circuit. A hole must be drilled through the board to allow the screw protruding from the underside to pass through.

Special care is necessary in drilling the holes for the IFTs. There seven holes to each, which includes 2 for the solder tags on the can. Make all holes somewhat oversized as this simplifies the job. Do not overlook the fact that the can tags pass through holes in copper "lands" left to ensure an earthed soldering point. Wherever possible mount resistors (all ¼ watt) in a vertical position to reduce space usage.

Once all components have been fixed in and a thorough check has been made, connect VR2 and switch on the supply voltage. **DO NOT** connect the BFO at this stage. Check that the current drain is not excessive and that the base, emitter and collector voltages are satisfactory. Obviously, if all is well, some kind of noise should emanate from the speaker, though this may be only a click when a screwdriver or probe is touched in a sensitive area.

If a VTVM is available confirm that T2 is oscillating. A lead brought from the antenna terminal of the station receiver to the vicinity of L9 will give an indication if the receiver can tune around 2.3 MHz or a harmonic of this. The oscillator should cover 2240 to 2310 kHz.

Autodyne mixers can be tricky sometimes even when correctly wired. If difficulty is experienced and you are certain that the wiring has been correctly executed it will be necessary to fiddle around to get the stage to "fire". Once it does it will be a "goer" ever after and give no trouble.

Adjustment of the rest of the receiver follows standard practice, but remember what was said about the BFO earlier. Line up the IFTs using a signal generator on a frequency of 450 kHz or lower.

Injection of a signal from the signal generator in the area of L5 enables the mixer stage to be aligned. The same applies to the RF stage.

Alignment of L4, L5 and L6 together with TC2 requires some explanation. The positioning of L4 is arranged to give a limited degree of coupling. If the slug of L5 is unscrewed too much it increases the coupling to a point where oscillation occurs. Therefore once the basic alignment has been achieved, set TC3 to mid capacitance, screw in the slug of L5 pratically all the way to the bottom of the coil, and adjust TC2 for maximum signal. Then unscrew the slug to peak the signal and again adjust TC2. This procedure should be followed until the stage oscillates. Screw in the slug to restore stability and readjust TC2. It should be possible to vary TC3 through maximum signal without oscillation occurring.

Initially C14 was 0.1 uF. It was found, however, that when IFT2 was peaked there was instability. By changing C14 to 0.001 uF the stage became docile.

It should now be possible to receive a signal though it may be necessary to wait for an amateur station to come on. Good results can be obtained even using a poor antenna such as a few feet of wire.

Incidentally no mention has been made of the coverage of this unit. This depends on the builder who can spread the band as much as he likes depending on (a) the capacity of VC1A, B, C, and (b) the values of C1, C5, and C9. The padding capacitor used in the prototype enabled the receiver to tune the band over about 60 degrees

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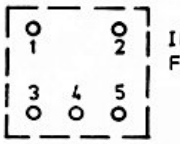
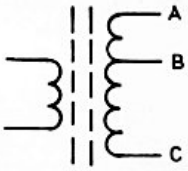


IFT. VIEWED FROM BELOW



PIN No.					
1	2	3	4	5	
SEC	SEC	A	B	C	TYPE A
SEC	SEC	C	B	A	TYPE B
SEC	A	C	B	SEC	TYPE C

which is quite adequate.

The BFO may now be switched on. A VTVM RF probe at C22 will indicate whether the stage is oscillating. With the receiver tuned in to a signal generator at 1820 kHz, set TC5 to mid capacity and adjust L6 until a good beatnote is heard. Set it to zero beat. This beat should tune from high pitch through zero beat to high pitch. Check that removing the signal removes the beat as it is quite possible that the 4th harmonic of the BFO itself may be tuned if the IF frequency was not set below 450 kHz. The harmonic will still be heard below the amateur band with the correct IF frequency.

Unforunately, there are so few SSB stations working on the band that it has not been possible to establish with certainty that the level of injection is optimum. With the coupling to T3 base there is plenty of injection available. More or less can be had by adjusting C22. If trouble does arise, C22 could be connected to T4 base or into its collector. These options are simple to experiment with but can only be tried with a regular and reliable SSB signal. This is left to the constructor.

There is only a slight tendency for the BFO to drift in the first few moments. The constructor may prefer to mount TC5 on the front panel as a BFO tuning control. As such it should have a value of about 10 pF. For the CW enthuslasts who like to vary the tone this is certainly a must.

PERFORMANCE

Originally the RF transistor was an OC170. This came to grief and was replaced with an OC44 without other changes. No instability was noted during tune up so, if available, the OC44 is recommended.

As for performance it compares favourably with an FRDX400 on sensitivity. The latter is better (and I should hope so as it costs a lot more), but not to the extent that I could not work anyone that anyone else was working. Selectivity is adequate for the present degree of activity on the band. For mobile working an external speaker is used as the small inbuilt speaker is a bit "hissy" and doesn't combat noise as well. Stability is very good, even dropping it a small height does not detune a signal.

To conclude it has proved to be reliable, effective, simple to build, rugged and easy to get going. I couldn't see myself without one.

PARTS LIST

R1 18K R6 47K R11 470 ohm R16 470 ohm R21 8.2K
R2 3.3K R7 10K R12 4.7K R17 4.7K VR1 10K pre-set
R3 1K R8 1.8K R13 22K R18 3.9K VR2 5K Log pot
R4 470 ohm R9 50K R14 1K R19 2.2K
R5 1K R10 1K R15 470 ohm R20 100 ohm
C1 69pf C6 150pf C11 2pf C16 .047uf C21 .047uf
C2 150pf C7 .1uf C12 10uf 6V C17 .1uf C22 2pf
C3 .047uf C8 .01uf C13 .1uf C18 .047uf C23 470pf
C4 .047uf C9 69pf C14 .001uf C19 100uf 16V C24 .0033uf
C5 69pf C10 100pf C15 2pf C20 .047uf C25 .001uf
CX to suit antenna used. Start at 150pf. No capacitor may be needed.
C23 Adjust to resonate L6 to IF if necessary.
TC1 TC3 TC4 TC5 3.30pf printed circuit board type trimmer
TC2-750pf compression type trimmer.
VC1A, VC1B, VC1C 3 gang 50/50/35pf or similar
IFT1, 2, 3, 4, 5, 6 Japanese type used in pocket portables (IFT 5 to suit diode detector.)
T1 OC44
T2, T3, T4, T5, OC170
D1 OA89
D2 OAZ207

Interference: The International scene —and applications locally

By the WIA Executive

The following brief resume would interest those who might like to have some knowledge of the immense amount of work being carried out in the international arena under the auspices of the C.I.S.P.R. The data has been culled from a report published in the March 1974 edition of I.T.U.'s Telecommunication journal and from various Standards Association of Australia publications and other sources.

The International Special Committee on Radio Interference (CISPR) consists of representatives of the National Committees of the International Electrotechnical Commission (IEC) and of other member bodies such as the Int. Union of Producers and Distributors of Electrical Energy (UNIPEDE), Int. Radio and Television organisation (OIRT), etc. The International Radio Consultative Committee (CCIR) of the ITU is represented in the annual Plenary Assemblies of the CISPR by observers.

The work of the CISPR is carried out by 6 main Sub-Committees the chairman of each appointing working Groups to advance the work in his domain. The Sub-Committees cover such fields as "D" Ignition interference and related subjects, "E" radio and television receivers, "F" Domestic appliances, "B" ISM RF apparatus, "C" High-voltage lines and equipment and "A" methods of measurement, etc.

It is interesting to observe the work carried out by the various Sub-Committees during 1973. Space here permits only a few examples to be quoted. Sub-Committee "C" looked at a new report which showed that the measurement of insulators correlates well with the measurement in actual operation in light and dry pollution, but not in areas of heavy pollution. "B" looked at microwave ovens, their spurious radiation and whether stricter limits might be necessary for domestic-use ovens below 5 KW, as well as beginning a study on interference from heavy current or high voltage thyristors.

Sub-Committee "D" dealt with methods of measurement for suppressors in cars, interference to radio reception in a vehicle arising from devices within the vehicle in two specialised fields, interference to mobile reception caused by adjacent roadside electrical installations, and devices and methods of measurement to cover such things as lawn mowers, motorboats, power tools, etc.

Sub-Committee "F" worked on new limits for portable tools, measurements relating to fluorescent tubes and a new recommendation on the measurement of, and limits for, interference caused by switching operations of electrical household and similar appliances.

Other work included a standardised form of listing complaints for analysis, permissible leakage currents and limiting values of radio interference suppression capacitors, detailed methods of evaluating interference to TV pictures and sound and coupling factors between sources of interference and receiver aerials. Some other areas examined included measurements for wideband interference (motors, IC engines, etc.) and narrow-band interference both in relation to conducted interference as well as radiated fields. The distance

My Latest News on YAESU MUSEN Equipment

I have been advised that production of the FT/FP transceivers will soon be phased out, the 200 is to be replaced by the new FT-201 transceiver, with built-in AC/DC supply, actually a cheaper version of the FT 101-B, mostly solid state, somewhat a hybrid of the 200, 501 and 101, estimated landed cost will be around $450.

There is soon expected production of the FL-101, a transmitter companion for the FR-101, with digital read-out possible in the de-luxe version, however, a rather dear set-up for us because of the standard import duties and sales tax on separate receivers & transmitters, in contrast to the duty-free imports of transceivers

There is a new version planned of the FT-620, the 6 Metre transceiver FT-620-B, identical in appearance to the 2 Metre FT-220; the latter will soon be somewhat modified and improved.

The FT-2-FB **has been discontinued,** to be replaced by the FT-224, a 24-channel 2 Metre FM transceiver, landed cost as yet unknown.

YAESU MUSEN

FT-101-B, supplies easing, almost ex-stock	**$525**
FT-DX-401 with built-in AC supply, 8 weeks	**$495**
FT/FP-200 discontinued.	
YC 355 D digital frequency counter, still only	**$250**
Spectronics DD-1 counter for 101/401	**$150**
FT DX 400/560 noise blankers,	**$20**
FT 101/101B/560 CW filters	**$30**
Sorry, no more 101 or 401/560 160 M Conversion Kits.	

HY-GAIN ANTENNA

14 AVQ 10-40 M vertical 19 feet tall no guys	**$50**
18 AVT/WB 10-80 M vertical 23 feet tall no guys	**$70**
TH3JR 10-15-20 M junior 3 el. Yagi	**$110**
TH3Mk3 10-15-20 M senior 3 el. Yagi soon	**$150**
TH6DXX 10-15-20 M senior 6 el. Yagi	**$175**
204BA 20 M monoband 4 el. full size Yagi	**$150**
DB 10-15 10-15 M 3 el. Yagi ideal for use over 204 BA	**$110**
Magnetic base mobile whip 108 MHz up with 18' RG-58U cable and coax plug	**$18**

CDR ANTENNA ROTATORS

AR-20, smallest model only for 2m beams	**$35**
AR-22R for stacked 2 & 6m or small HF beams	**$45**
Ham II with re-designed control box, now with separate brake-control	**$135**
All for 230 V AC with indicator-control units.	

BARLOW-WADLEY RECEIVERS

Model XCR-30 Mk II 500 kHz to 31 MHz continuous coverage, crystal controlled reception of AM/USB/LSB/CW	**$225**

NOISE BRIDGES

Omega TE 01 up to 100MHz	**$25**

POWER OUTPUT METERS

Galaxy RF-550A with 6 pos. coax switch	**$75**

SWR METERS

Midland twin meter type, 52 ohms	**$20**

BALUNS

New Japanese model, 52 or 75 Ohm 1 KW PEP	**$10**

MOBILE ANTENNA

Mark helicals 6 feet long	HW 40, 40 M.	**$18**
	HW 20, 20 M.	**$16**
	HW 80, 80 M.	**$18**
	high power KW 40, 40 M.	**$25**
	tri-band helical HW 3, 10/15/20 M.	**$25**

CUSH CRAFT ANTENNA PRODUCTS

DGPA 27-50 MHz ground plane	**$25**
AR-2 144 MHz Ringo	**$20**
LAC-2 lightning arrestors	**$6**

ELECTRONIC KEYERS

Katsumi model EK 105A 230V AC with paddle	**$35**

CRYSTAL FILTERS

9 MHz similar to the FT 200 ones, with carrier xtal	**$30**

POWER SUPPLIES

240 AC to 12V DC 3 to 3.5 Amps. regulated	**$30**

LOW PASS TVI FILTERS

Cut-off frequency 35 MHz 6 section filter	**$18**

MIDLAND

PTT dynamic microphone	**$10**

27 MHz NOVICE LICENSEE & CITIZEN-BAND EQUIPMENT

MIDLAND 5 W AM 23-channel transceivers complete with PTT mike all channel crystals 12 V DC op. **$95**
PONY 5 W CB-78 identical to Midland 5 W transceivers, **$95;** CB-74 5 W AM with 27.880 xtals, fishermen **$80**
SIDEBAND BRAND NC-310 one Watt hand-held transceivers **$50;** SE-501 SSB/AM 15 W PEP SSB 23-channel transceivers, complete with PTT mike etc. 12V DC **$175**

144 MHz TWO METRE EQUIPMENT

MULTI-7 solid state 24 channel FM 12V DC transceivers, 1 and 10W output, receiver with FET rf stage and mixer, equipped with crystals for TEN Australian channels Nos. 40, 42, 44, 46, 48, 50, 54, 56, 58, 60, to be used either transceive or combinations repeaters and ANTI-repeaters, complete with PTT microphone, mounting bracket **$225**

KEN PRODUCTS KP-202 hand-held 2 W output transceivers, now with 4 Australian channels, 40 & 50 plus a choice of 2 repeaters 42/54, 44/56, 46/58, 48/60 **$150;** KCP-2 battery charger and 10 NICAD batteries **$35**
Leather case for KP-202 **$5;** Extra crystals for KP-202, two crystals per channel **$8**

KLM ELECTRONICS solid state 12V DC 2 M. amplifier, 12 Watt output, automatic antenna change-over when driven, ideal for mobile use with the KEN KP-202 **$50.**

BELCOM LINER 2 SSB 20 Watt PEP SSB 12V DC solid state transceivers **$250.**

YAGI ANTENNAS 9 element 10 ft boom with gamma-match coax feed **$30.**

INTRODUCING the latest in all-band amateur transceivers,

the new KENWOOD TRIO TS-520

There are no compromises on this beautifully finished transceiver, featuring a die-cast front panel. The TS520 will be in stock from mid-October 1974 onwards. Here are the specifications:
All for only $500.— including the TRIO external loudspeaker. The external VFO will also be available.
. . . Arie Bles

Here are 30 special reasons you will want to own a TS-520. After you have operated one, you will doubtless give us 30 more why you're glad you own one.

1. **Built-in AC power supply**
2. **Built-in 12 volt DC power supply**
3. Built-in VOX with adjustable gain, delay and anti VOX
4. 1 KHz dial readout
5. Ultra stable FET linear VFO
6. Built-in noise blanker
7. Built-in RIT circuit and RIT indicator light
8. 8 pole crystal filter
9. Built-in 25 KHz crystal oscillator
10. Provisions for optional CW filter
11. Break-in CW with sidetone
12. Completely solid state except final section. Compact, low current, reliable with heater switch for mobile receive-only operation
13. Built-in cooling fan
14. Accessory external VFO & accessory external speaker
15. Built-in speaker
16. Modern styling & functional design. Modular construction.
17. Amplified ALC
18. TUNE position increases tube life
19. Maximum TVI protection
20. Built-in fixed channel operation (4 channels) with indicator light
21. Provisions for use with a VHF transverter
22. Full metering
23. Selectable SSB
24. Selectable AGC operation for different modes
25. VFO indicator light
26. Built-in selectable ALC action for speech processing
27. Carrying handle
28. Rugged 6146 type final tubes
29. Internal cross-channel operation.
30. Push button WWV reception

Proven Kenwood quality and reliability

All prices quoted are net, cash with orders, sales tax included in all cases, subject to changes without prior notice. No terms nor credit nor COD, only cash and carry, Government & Public Company orders included. Include 50 cents per $100 value for all-risk insurance, freight, postage and carriage are all extras. MARY & ARIE BLES, Proprietors.

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TELEPHONE, **DURING BUSINESS HOURS ONLY!** STD 047 511-394

at which a radiation measurement is made depends on the average distance between the source and the receiving antenna. For TV local oscillators that may radiate through the antenna of the set, a distance of 3m was chosen, for measurement of car ignition noise a distance of 10m, and for measurement of ISM apparatus a distance of 30m.

The coupling factor between sources of interference and receiver aerials has been measured for many years and additional investigations are carried out all the time to achieve clear definitions on a standardised basis. The immunity of TV receivers to external (signals entering via the aerial) and internal (e.g. signals entering via the chassis, etc.) forms of interference benefited from work being done over many years in various countries. Much effort is devoted to the definitions of limits for interference of various kinds and as the article stated "a more pragmatic approach was used. One sees the number of complaints and one tries a method of suppression that seems economically justifiable".

The method by which CISPR works is to start by agreeing that suppression of the interference caused by certain sources is desirable. This leads to a study question. Work on this question is taken in hand in several National Committees and by Working Groups consisting of experts in the field. The study should lead to a Recommendation (or sometimes to a Report). The CISPR then asks its member bodies (amongst which are the National Committees of the IEC) to see to it that these Recommendations are used in national legislations and international agreements. The CCIR has recommended all Administrations to follow the methods of measurement and limits of CISPR in their legislation, where possible.

The purpose of CISPR, so states the article, is the abatement of interference and thus better reception possibilities, among others for television, **can only be reached through legislation.** Many countries have already taken steps in this direction and it is hoped that others will follow, for the benefit of all TV viewers and listeners.

So much for a part review of one aspect of international work going on all the time. To return now to Australia we must examine how the various international recommendations are put into operation for local application. It should be noted that the APO is a member of the ITU quite apart from having a voice on various other co-related international organisations. The IARU has observer status at ITU Conferences but otherwise operates mainly through member Societies dealing direct with their local Administrations in a cohesive fashion.

If you read the preface to AS 1044-1973 issued by the Standards Association of Australia (SAA) relating to Limits of Electromagnetic Interference, you would note "the limits and methods of measurement specified are as far as possible, in accordance with the recommendations of the CISPR" — "Account was also taken of BS (British Standard) 800", etc.

SAA Council appoints a number of specialist Committees to examine and report upon the work to be undertaken, be it in the fields of electronics, building materials and so on. The SAA's Telecommunications and Electronics Committee TE/3, dealt with standards such as the one mentioned above which relates to electrical appliances and equipment, AS 1053-1973 relating to Radio Interference Limits and Measurements for Television and Radio Receivers, and AS 1054-73 for semi-conductor control devices, etc.

This particular Committee TE/3 comprised representatives from a wide range of interested parties including the PMG's Dept., IREE, DCA, Dept. of Supply, ABCB, Associated Chambers of Manufacturers, Elec. Supply Assoc., Electronics Assoc., etc. It follows therefore that any special local requirements would receive discussion in the light of a range of international documents including standards adopted in various other overseas countries. Whenever a new standard is recommended or an existing standard is to be revised the SAA publishes it in draft form for public review and comments are sought from the public within a specified period. When a standard is published it is there for adoption by those concerned. Anyone not complying with any particular standard relating, for example, to a product which he manufactures or imports, could find his product unacceptable for a wide range of applications. Few would be willing to take this risk knowingly.

Mr. Myles Wright in his opening address for the 1973 RD Contest (published on p.21 of AR for Oct. '73) drew attention to TVI particularly relating to colour TV and spoke about the development of good housekeeping methods to keep our pollution within our own backyards. The projected and anticipated incorporation of relevant SAA standards into legislation has already received considerable attention by the WIA. Members are quite likely to find themselves placed in awkward situations particularly in metropolitan and marginal reception areas when colour TV comes into general use. A member's TVI problem is most unlikely to be unique, but even if it is, the member concerned should feel that some technical and similar advice ought to be readily and timely available to him.

For this very purpose the Executive, in concurrence by Federal Council, has taken steps to set up an E.M.C. (Electro-magnetic Compatibility) Committee on a Central basis to render expert technical advice to Divisional Interference Committees which it is hoped will be appointed in each Division, to liaise with them and generally to give advice in technical and other areas to the Executive relative to EMC. Mr. Peter Williams VK3IZ, has been asked, in his stand-in role of EMC Co-ordinator, to set up the Central EMC Committee with the concurrence of the WIA Victorian Division where the services of some members of the Committee would derive.

The PMG Handbook Sub-Committee of the Executive has also been looking at the interference problem in relation to the revision of the Handbook and, ipso facto, the possibilities of submissions which might be necessary in relation to any consequential revision of the Wireless Telegraphy Regulations.

Probably the EMC part of interference is likely to respond to intelligent treatment under suitable conditions. Unfortunately the human element could, and does, pose a far more difficult problem to resolve.

In any community there is a percentage of people blessed with a super-abundance of leisure with characters which delight in creating difficulties where none should exist.

If your own transmissions cause no interference with your own TV, radio, etc., this is likely to goad a complainant of the kind described into greater efforts to embarrass you. This is most likely to occur if, unluckily, your initial response to any complaint might not measure up to his expectations. The more you attempt to find a solution the more will your efforts be suspect. And so the thing snowballs into an 'issue' and the big 'squeeze' could begin. Hints of court action maybe. Letters to the Minister or to Parliamentarians. Perhaps other neighbours suddenly 'discover' that your tower and beam are an eyesore and must reduce the values of their properties.

Thoughts crowd in about 'social blackmail' and what does all this do to the public image of amateur radio?

Several local Town Councils in VK-land are notoriously known for the nearly impossible task of getting permission from them to erect a tower or mast for amateur operations. Some even go to the extent of finally approving a tower, but as soon as a beam is mounted on it ordering that the beam shall be removed because the authorisation for the tower did not include details of things to be mounted thereon.

The editorial in Short-Wave Magazine for April '74 illustrates one of these problems:

"It seems that a licensed amateur at Thurnscoe, Yorks was ordered by the local Dearne Valley Council — **ordered by his local Council, mark you** — to 'cease operating on the grounds of amenity and nuisance'. His neighbours had complained of TVI. And who, do you think, clamped down on this Council on his behalf? (None other but) the Post office who said that in the first place, the amateur concerned was **not** causing TVI and that anyway the Dearne Valley Council had no authority whatever to close down, by their diktat, a licensed amateur — who happens, incidentally, to be a 54-year-old confined to a wheel chair with multiple sclerosis". The editorial comment ended, "After all, one of the functions of your local 'Chief executive' (as they like nowadays to be called) is to empty your dustbin".

"Make sure your 'garbage bin' has no pollution in it to offend your neighbours" might be a suitable moral on which to conclude this short article. ●

MODIFICATIONS TO THE VINTEN MTR12 FOR OPERATION ON 52.525 MHz FM NET

R. H. Wales, VK3ACM
Samaria Roadside, Via Benalla, 3672

The Vinten MTR12 is a low band all valve unit, similar to the well known MTR13. It uses valves with greater filament current requirements, and so the overall current drain is slightly higher. However it is similar in design to the MTR13.

BASIC MODIFICATION DATA — RECEIVER
All the front end coils are close wound, enamelled wire, same gauge as original. All coils are 5/16 inch inside diameter.
Aerial coil — 13 turns, tap 2½ turns from cold end.
*RF stage plate coil — 13 turns.
*1st mixer grid coil — 13 turns.
Oscillator plate coil — 14 turns.
Oscillator screen coil — i.e. coil No. 140, add 15 pf to winding.
*Coupling between these coils to be the same as original.

CRYSTAL FREQUENCY —

$$Fx = \frac{Fc-2}{5}$$

Where Fx is crystal freq.
Fc is freq. of operation.
For 52.525 MHz the Rx crystal is 10.105 MHz.

BASIC MODIFICATION DATA — TRANSMITTER
Coil No. 137X — add 47 pf on each winding.
Coil No. 121 — add 15 pf on winding.
3/12 2nd doubler plate coil — add 15 pf.
3/12 final grid coil — add 10 pf.
3/12 plate coil (final) — replace with 10 turns 128 SWG wire, 1 inch inside dia. spaced 2 inches.
Aerial coupling link — should be 2 turns.

CRYSTAL FREQUENCY —

$$Fx = \frac{Fc}{24}$$

Where Fx is crystal freq.
Fc is freq. of operation
For 52.525 MHz the Tx crystal is 2.18854 MHz.

TUNING UP — RECEIVER
Plug in the Rx crystal, connect a high impedance meter (or VTVM) to TP1, set meter to 60 volt DC range. Adjust coil No. 140 for max. reading, making sure that crystal starts reliably, typical reading, 10 volts.

Connect meter to TP2 i.e. 1st Limiter, set meter to 300 uA range. Connect a sig. gen. to antenna socket and adjust C1, C4, C5, C14 and T2 (Coil No. 133) for max. limiter lg. It may be necessary to use a transmitter on the frequency initially to get enough signal to tune up on.

Peak all cores and trimmers on **weak** signal. With a known accurate signal, connect a 25-0-25 uA meter to TP4 i.e. Discriminator and adjust crystal frequency with trimmer to give zero meter reading.

The above assumes that the 2nd IF is correctly lined up; this must be done first (refer AR March '74, page 13).

TUNING UP — TRANSMITER
Plug in the Tx crystal, connect a high impedance meter to TP5 — Osc. lg. set meter 60 volt DC range. If crystal is oscillating reading should be around 14 volts. Connect meter to TP6 — 1st trip lg. set meter to 300 uA range, a typical reading here is 35 uA.

Note:
There are no adjustments on these two test points. Connect meter to TP7 — 2nd trip lg. set meter to 1 mA range, peak coil No. 138 for max. typical reading 500 uA. Connect meter to TP8 — 1st doub lg. set meter to 1 mA range, peak coil No. 137 for max. typical reading 350 uA. Connect meter to TP9 — 2nd doub lg. set meter to 6mA range, peak coil No. 121 for max. typical reading 1.2 mA. Connect meter to TP10 — final lg. set meter to 6 mA range

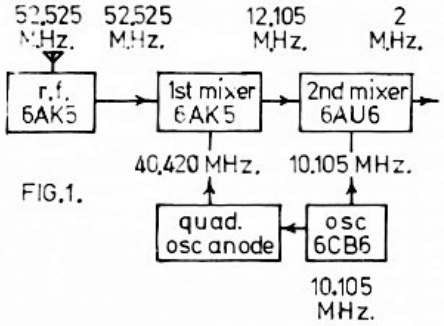
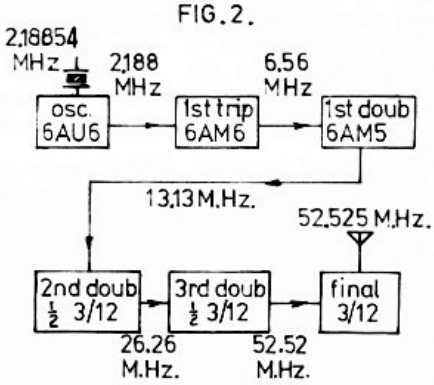


FIG.1.

FIG.2.



peak trimmers for max. typical reading 2.3 mA.

Adjust final tuning and coupling for **max RF power out.** The deviation can be set either by using a deviation meter or by getting an on-air report. A GDO is a big help in getting the Tx going.

This completes this article, the complete circuit diagram is too large to be reproduced here. The units are capable of good performance and like most Vinten equipment should give years of satisfactory performance, although they are a little "old" by todays "solid state standards". ●

MODIFICATIONS TO THE MTR15 FOR OPERATION ON 53.032 AM

The Vinten MTR15 is a low band AM unit, and as such for those interested it is an ideal unit for the 53.032 AM 6 mx net frequency. The unit normally has a separate power supply (transistor type). It also has a relay mute and noise limiter although in my quiet country location I removed both of these.

BASIC MODIFICATION DATA — RECEIVER
All the front end coils are close wound, enamelled wire, same gauge as original and all coils are 5/16 inch inside diameter.
Aerial coil — 11 turns, tap 2½ turns from cold end.
RF stage plate coil — 11 turns.
1st mixer grid coil — 11 turns, tap 7 turns from cold end.
Oscillator plate coil — 13 turns, add 10 pf across trimmer.
Oscillator screen coil No. 111 — rewind with 45 turns same gauge wire as original, add 25 pF across coil, making a total of 40 pf.
1st IF transformers (coils No. 118) — rewind each winding with 20 turns of approx. 28-30 SWG wire, space coils as original. Remove any external capacitors.
The main IF is 435 kHz, this could be easily returned to 455 kHz if desired, however the crystal frequency would be slightly different.

CRYSTAL FREQUENCY —

$$Fx = \frac{Fc - 435}{5}$$

Where Fx is crystal freq.
Fc is carrier freq.

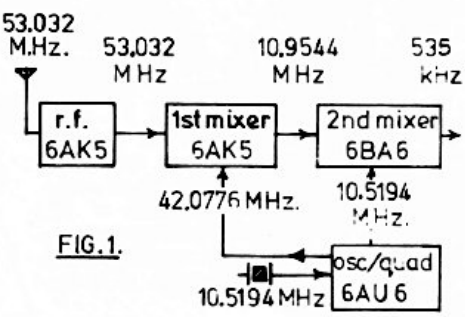
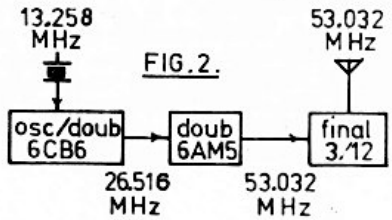


FIG.1.

FIG.2.



●

For 53.032 MHz the Rx crystal is 10.5194 MHz.

BASIC MODIFICATION DATA — TRANSMITTER

Oscillator coil No. 122 — remove 5 pf, replace with 25 pf.

Oscillator plate coil No. 121 — rewind with similar gauge wire, 26 turns, remove any tuning capacitance.

6AM5 plate coil — replace with 11 turns of same gauge wire, 5/16 inch inside diameter.

3/12 grid coil — replace with 11 turns of same gauge wire, tap at centre (6th turn) 5/16 inch inside diameter.

3/12 plate coil — replace with 15 turns, ½ inch inside diameter spaced 1-5/8 inch, approx. 14 gauge wire, tap at centre.

Output link — 3 turns of insulated wire.

CRYSTAL FREQUENCY —

$$Fx = \frac{Fc}{4}$$

Where Fx is crystal freq.
Fc is carrier freq.

For 53.032 MHz the Tx crystal is 13.258 MHz.

TUNING UP — RECEIVER

Plug in crystal, connect a **high impedance** meter (or VTVM) in socket opposite 2nd can of 1st IF, set to 60 volt DC range, adjust coil No. 111 for max. reading, making sure that crystal will start reliably. Connect meter to socket opposite last 2nd IF can (No. 124). Connect a sig. gen. to aerial and adjust trimmers for max. reading. It may be necessary to use a Tx on the freq. intially to get the Rx going. It is most important to use a high impedance meter at this point as you are in effect reading AGC voltage. Finally peak all trimmers and cores on weak signal.

Note:
The above assumes the 435 kHz IF is correctly lined up.

TUNING UP — TRANSMITTER

Plug in crystal, connect meter (set to 12 volt DC) to socket opposite 6CB6 oscillator, adjust coil No. 122 for max. making sure that crystal starts reliably. Connect meter to socket opposite coil 121, set to 500 uA range, adjust coil No. 121 for max. Connect meter to socket opposite 3/12, set to 500 uA range adjust the two trimmers — 6AM5 plate. 3/12 grid; for max. drive. Adjust final tuning and coupling for **max. RF power out consistent with good modulation.**

The socket near the mute relay is the 3/12 plate current; do not run in excess of about 90-100 mA. A GDO is very handy in setting unit up initially.

This article may seem a little outdated with the trend towards FM channels and SSB operation on 6 mx, but if you happen to have such a unit and are wondering what to do with it, then this article may be of some help. The unit performs quite well and will put out approx. 10 watts of unmodulated carrier.

There is still some activity on 53.032 at least during the DX season anyway, and a few amateurs in the country have this net frequency — around the North East anyway (where there is no channel 0 or 1 problem).

The complete circuit would take up too much space to be reproduced here. ●

The International Fox Tango Club

The above club was formed in January 1972 by Milton LOWENS, WA2AIQ, 3977-F Sedgwick Ave., Bronx, New York 10363. Milton is also editor of the "FT Newsletter". The newsletter is published 10 times per year, and also includes information relating to other models as well.

The club consists of owners of Yaesu FT101 transceivers who have banded together to exchange ideas for their mutual benefit.

The club now has a membership of over 1000 amateurs in 33 countries.

In QST of February 1974, an excellent 'critique' of the FT101 B was published. On specific points, the QST story lists seven "Other Observations" or "faults" which can be discussed more objectively. Thereunder is the FT Newsletter's comment on these "observations" and which we consider most appropriate to be reprinted from their July-August 1974 issue.

"1. **RECEIVER CROSS MODULATES AND OVERLOADS** on strong local signals. (Built-in selectable 20-dB receiver pad helps reduce the problem.)

Comment: This is an old story. Many say that the FT-101B performance in this respect is better than the older models, but the fault may still be present to some degree. Judging from the number of letters received on this fault, it seems much diminished. The stories published in the Newsletter over the last three years also reflect diminished complaints.

2. **AGC CHARACTERISTICS** cause popping and clicking unless rf gain is turned back approximately one-third of the full amount.

Comment: This is a new one to me. No one has written about this, to me at least, and I have not noticed it in my own (older) rig. If it is a fault, who can come up with a 'fix'?

3. **LOUD TRANSIENT CLICK OCCURS IN HEADPHONES** when VOX drops out after transmit periods.

Comment: Yes, there has been some comment about this, particularly from South Africa, where Larry Henn, ZE1DP, did a long and fascinating study of the causes of what we call VOX POP. More recently Dave Johnson, W7HV found a cure in audio muting.

4. **WASTED BAND POSITION** results from inclusion of 27 MHz CB range.

Comment: Not everyone agrees that it is wasted; especially Europeans in countries where amateur operations on these frequencies is legal.

5. **MICROPHONE MUST BE DISCONNECTED DURING CW OPERATIONS** to prevent VOX from constantly cycling on and off.

Comment: Touche! This is true, and has been from the very beginning. And more amazing is the fact that it continues to the very latest models, even though the cure is quick and easy, and involves no extra parts or labour in manufacture! I estimate at least a half-dozen "cures" have been suggested in the Newsletter and the factory receives (and apparently reads) the Newsletter. For those who don't like to play with their circuit boards, still another idea using a mercury switch in the mike to 'cool' it when it is undesirably 'hot' appears in this issue.

6. **POWER SUPPLY HAS SUFFICIENT RIPPLE TO CAUSE A T8 CW NOTE.** (Shunting additional 100 mF of capacitance across power-supply filter output solved the problem.)

Comment: This is a rare one too, although one or two members did mention noting it. Its rarity may suggest that the cause may be other than inadequate filtering. Fred Bail, VK3YS, has found instances in which hum was caused by one of the diodes in the HV power supply bridge circuit opening up causing half-wave rectification (rather than full-wave). If you have the problem, better check.

7. **NOISE BLANKER INEFFECTIVE.** Three FT-101's were tested, and the blankers performed poorly even though adjusted in accordance with the instruction manual. Also, the blanker caused cross modulation to worsen when strong signals were present.

Comment: This is another puzzler because some members agree with the above while others say the noise blanker is great. Maybe the trouble is in the instruction manual rather than in the blanker. The manual says nothing about how the blanker circuitry can be aligned; and maybe it was out of alignment . . . even if this seems unlikely in all three sets tested.

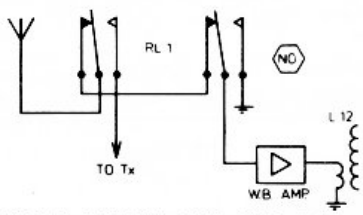
Of course, the purpose of the QST article was to report its findings rather than to seek cures of any faults noted, even though it did suggest one in 6 above. However, since the Newsletter serves mostly those who have already purchased the set, its emphasis has been, is, and will continue to be on means and methods to reduce weaknesses when discovered, and to increase the many strengths of the FT-101."

Any readers of AR requiring information of membership, fees etc., are invited to write to Milton at the address appearing in the first paragraph of this article. ●

Commercial Kinks

with Ron Fisher VK3OM
3 Fairview Ave., Glen Waverley, 3150

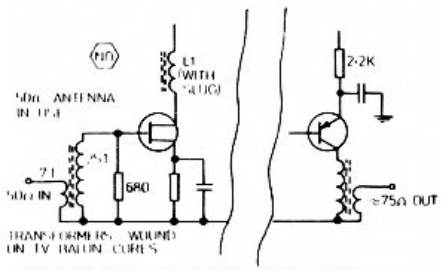
It had to be only a matter of time before we got back to the FT200. The prompt came from Frank Beadle VK6FW. Luckily for us (not for Frank) he found time to play around with his 200 while recovering from an injured back. Readers will no doubt remember the wide band amplifier for the FTDX400 described by Kerrie Adams VK5SU in AR for November 1973. Many were disappointed when they discovered that this unit could not be used with the FT200. With a few simple modifications Frank has overcome this, but I think I will let him tell the story.



WIRING POSITION FOR WIDE-BAND AMP IN THE FT200

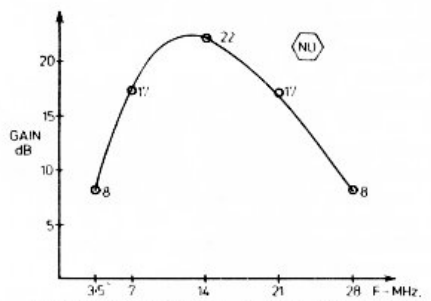
'First, the alignment of the receiver was touched up according to the handbook and the modification to C165 in the detector was incorporated making C165 variable for optimum detector injection. Then the S meter was adjusted for zero and sensitivity (50 uv for S9) using a Marconi Generator type 775.

The interesting result was the confirmation of the previous suspicion that each S point does not give a result for 6dB signal change (far from it). Then another modification was incorporated, the inclusion of the Wide Band Pre-Amp as described in AR for November 1973. This pre-amp was modified in that the input and output were wide band transformer coupled, and it was wired in series with aerial feed from the antenna relay and the input winding of L12. This has two main advantages: (1) You do not need or have to adjust the input capacity as described in the Wide Band Amp article. (2) High level signals (transmit) from the plate of the 12BY7A driver do not get to the input of the amp — so it does not get any high level clouts. It will be noted that my pre-amp has considerably more mid-band (7 to 21 MHz) gain than the one described. This may be due to the fact that I also added a Neosid slug to L1 in the pre-amp or perhaps due to the input output transformers.



MODIFICATIONS TO WIDE-BAND AMP.

The tables give the plotted results but some comment is necessary. First, some slight discrepancies in the tabulated results are apparent. This was obvious during the measurements as the filter in the receiver has a fair amount of ripple and caused some variations. Also it is easy to be 2 dB out reading the S meter. Secondly, it appears that there is some non-linearity in the receiver as the input frequency increases, why I don't know.



APPROX FREQUENCY RESPONSE OF THE MODIFIED WIDE BAND AMP.

However, the results I found interesting, particularly the compression of the S meter scale at the low end. Unfortunately I did not plot the S meter response without the pre-amp before I returned the signal generator to its owner. ●

PLOT OF "S" METER (Wide Band Amp. in Circuit) f = 3.6 MHz. Constant f (MHz)

Meter Reading	S1	S2	S3	S4	S5	S6	S7	S8	S9	S9 +10	S9 +20	S9 +30	S9 +40	S9 +50	S9 +60
Signal Input	2.5 uV	3.5 uV	4.5 uV	6 uV	8 uV	10 uV	12 uV	16 uV	22 uV	40 uV	80 uV	200 uV	500 uV	1.6 mV	4.0 mV

"S" METER INDICATION (Variation of f MHz and Signal input)

Note — S meter does **not** give 6 dB / S point.

*This would indicate 12 dB gain at 28 MHz, hence remarks re filter ripple and S meter.

Frequency (MHz)	Without Wide-Band Amp Constant 50 uV in	Input for S9	With Wide-Band Amp Constant 50 uV in	Input for S9
3.5	S9	50 uV	S9 + 14 dB	20 uV
7.1	S9 + 2 dB	40 uV	S9 + 30 dB	6.3 uV
14.2	S9	50 uV	S9 + 31 dB	4.0 uV
21.35	S9 + 6 dB	28 uV	S9 + 25 dB	6.3 uV
28.7	S8	80 uV	S9 + 12 dB	20.0 uV*

Newcomers Notebook

with Rodney Champness VK3UG
44 Rathmullen Rd., Boronia, Vic., 3155

A SHORT CIRCUIT FROM ZERO BEAT

Due to illness and pressure of work I have not had time to do much in the way of preparation for this months issue so have brought to the fore a technical hint from the **Short Circuits** section of the **YRCS** magazine **Zero Beat** for April 69. The headphones mentioned in the article should be high impedance, even some of the small Japanese crystal earpieces could be suitable.

"For our younger members who may have not yet advanced to sophisticated test equipment other than a multi-meter you may like to try this. If you want to check for lost audio in a receiver circuit obtain a pair of headphones, a small value high voltage paper capacitor (or mica), diode and some alligator clips. Connect one lead of phones to the chassis, the other to a pigtail of the capacitor. Using the other pigtail as a probe you can now check for audio in the audio amplifier section. If you suspect the receiver detector or want to check the RF section clip the diode between the chassis and lead and check control grids and at appropriate components. But, don't forget that capacitor to isolate DC."

For further information on a simple RF detector probe I would suggest re-reading June and September 73 **Newcomers Notebook.** Like Eric Jamieson, I have problems doing study and keeping up with other activities, so the size of **Newcomers Notebook** will be restricted probably for many months to come. Next month some more short circuits. ●

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With Syd Clark, VK3ASC

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Ideas for Building Transceivers; Galbraith Counter; Electronic A.R.T.

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HAM RADIO May 1974
Log-Periodic for 15 and 20; Parabolic Antenna Design; Antennas and Satellite Communications; Antenna Ground Systems; Antenna Measurements; Three Band DX Vertical; 160 Metre Receiving Antenna; 5/8-Wavelength VHF Antennas; Antenna Tuner; Vertical Radiation Patterns; Pi Network Design.

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Cosmos Electronic Keyer; Better Receiver Design; Function Generator; Coherent FSK RTTY; 2 m Preamplifier; Optimum Height for Horizontal Antennas; Local Oscillator Waveform Effects; Understanding Spectrum Analysers; Private Line for the Heathkit HW-202; Dipole Beams.

RADIO COMMUNICATION June 1974
Some Interesting Uses for TAA661 Integrated Circuits; The Heathkit HW202 2 m FM Transceiver (Review); Some Thoughts on True Break-in for CW and SSB; Building Blocks for the Novice. ●

TELECOMMAND AND TELEMETRY OF THE OSCAR 6 AND 7 COMMUNICATIONS SATELLITES

PART 1

DAVID HULL, VK3ZDH
Project Australis

The advent of long life amateur communication satellites with the launch of Oscar 6 in October, 1972, brought to the amateur service for the first time the problems of housekeeping on active space satellites. Added to the inherent problems was a technical fault in Oscar 6 which manifested itself soon after launch. This fault tended to reverse the satellite battery charge condition at each terminator, i.e. each day to night transition and vice versa.

INTRODUCTION

Oscar 6 was not designed for continuous operation. The mandatory battery charge periods therefore made it imperative that orbit by orbit observation and command be carried out if the satellite was to achieve its design life for 12 months. That the satellite was still functioning well 18 months after launch is due to the success of the housekeeping efforts of the world wide command stations and to the successful operation of the Australian designed and built command system. This article deals with this system and with the evolution of the two automated command systems in Canada and Australia that now carry the responsibility for the command of Oscar 6 and will continue to do so with Oscar 7. In addition the telemetry system of the two satellites which were partly designed and built in Australia will be discussed.

When Oscar 6 was launched it was intended that a small number of stations in the USA, Australia and Europe would be fitted with command capability to enable the satellite transponder and beacons to be switched off periodically for battery charging, etc. However, the above mentioned fault which showed up on the first few orbits showed a need for either a vastly increased number of command stations with attendant scheduling problems, or for an automatic system whereby preloaded commands could be sent at prescribed times and prescribed antenna settings. The initial chain of manual command stations in Region 3, one in New Zealand, two in Victoria and one in Western Australia, operated satisfactorily for two to three months, but due to pressure of work and inconvenient orbit times (i.e. 0500 in Eastern Australia) a number of orbits were missed entirely.

This showed in erratic voltage changes of the satellite battery, sometimes overcharged, sometimes undercharged. Operation of the intended US command station at the radio club station at Talcott Mountain was unsatisfactory also and this compounded the problem. Automation was the only obvious answer and crash design programmes commenced simultaneously in Canada and Australia in early 1973. These programmes were carried out independently and largely without knowledge of each other. Both systems were tailored to what was locally available, and differ greatly as a result. Both were private individual projects financed and built by one person.

THE SPACECRAFT COMMAND SYSTEM — OSCAR 6

The command system uses audio frequency tones, digitally encoded, transmitted to the satellite over a frequency modulated link. The appropriate command frequency is, after being demodulated, fed to the command decoder. Frequency modulation of sufficient deviation is used to nullify the effects of doppler shift on the received signal and to provide demodulated audio tones of constant frequency. An enable tone sets the decoder and this is followed by a 3 of 7 bit code transmitted serially by two other tones. 21 command functions are available for Oscar 6.

Control can be exercised over the 2-10 m repeater, the 435.1 MHz beacon, the repeater receiver AGC, the selection of morse code telemetry or an internal static shift register memory as readout to the beacons, speed of morse code telemetry, the spacecraft internal clock and the shift register load controls. Several redundant commands are provided and a redundant command encoder selected by one substitution is provided in the event of a command malfunction. This has not been necessary so far. The 896 bit static shift register memory is also loaded by tone selection on the command frequency.

Because of the receiving system used on Oscar 6 considerably greater power is required of the command transmitter than is necessary to operate through the repeater. This, combined with the use of the tone enable system and a special command frequency, has so far ensured security of the command operation.

AUTOCOMMAND — 1. The Canadian System

The Canadian autocommand system built by Larry Kayser VE3QB and subsequently duplicated by Randy Smith VE2BYG was much more a result of evolution than was the Australian system which was designed as a package and built as such. Initially in Canada magnetic tape recorder loops were made of the appropriate OFF and ON commands. A thirty-second timer and a little logic circuitry provided a basic remote control circuit that was connected to the home telephone ringing circuit, so that simply by telephoning home, the transmitter and tape recorder were activated for thirty seconds of ON or OFF commands.

For the next few weeks, it was not uncommon to see Larry dash for a telephone, dial a number, and hang up. This went on several times in a ten-minute period for each pass. Unfortunately, it was still impossible to cover all orbits this way, and occasionally, important orbits were missed when a telephone was not available. Fully unattended automation was certainly more desirable.

Since computer control was anticipated, a time interval of 2½ minutes was selected to be used as an interval between commands, partly based on pointing considerations for the antennas used and also based on the number of characters per printed line of the time-share computer available. A countdown circuit was made up from a 4 MHz clock source whose output was counted down to provide a pulse each 150 seconds which was used to increment an eight-level ASCII paper tape reader that was available. This reader was connected to the original 30-second timer, spare contacts were used to switch the antennas, and thus emerged the so-called Half-SMART concept (System Multiplexing Amateur Radio Telecommands).

The next step was to construct a full Australis digital command encoder unit and tie this into the tape reader to provide full, programmable digital control of the commands to be sent. This was badly needed because of the severe wear-and-tear the tape recorders were experiencing up until this time.

At this point, things were getting better, but a multiple command capability was needed to provide for execution of more than simple ON or OFF commands. In addition, it was desirable to have the capability of selecting between several antennas and to be able to alter the satellite operating schedule to permit special experiments to be conducted on certain orbits. With the assistance of Gregg Heppenstall, VE3GIH, digital integrated circuits were used to accomplish this.

The basic ASCII code, represents alpha-numeric symbols as combinations of eight binary bits on paper tape. For the auto-command application, three types of control symbols were used:

1. A "wait" pulse given at 2½ minute intervals.
2. A "Command" pulse sent at 2, 4, 8 or 16-second intervals.
3. A "rub-out" or "disregard" pulse.

The "wait" pulse was sent whenever a carriage return, line feed or space was executed. The "command" pulse was sent when a valid command was to be read on the tape. The "rub-out" pulses were used to ignore errors that occur in the preparation of the command paper tape. In the present case, the paper tape contained sporadic errors which were a by-product of the time-share computer used for the tape's preparation.

The various other symbols on the tape were used to programme the command encoder, key the transmitter and select the proper antenna.

Eight of Oscar 6's 21 command functions were selected as having higher priority for automatic generation. These include:

1 Two-to-ten metre repeater ON
2 Two-to-ten metre repeater OFF
4 435.1 MHz beacon OFF
7 Morse code telemtry at 20 WPM
9 Two-to-ten metre repeater AGC ON
15 Enable spacecraft clock
17 Reset spacecraft clock

On a normal satellite ON day, commands, 1, 4, 7, 9, 15 and 17 would be sent, while on a regular OFF day, commands 2, 4 and 9 were transmitted.

The eight selected commands were represented as binary combinations of bit positions 1, 2 and 3 on the ASCII tape. Bits 4 and 6 were used to select one of four antennas, and bit 5 was used to activate the command transmitter.

(To be continued)

QSP

PROJECT SANGUINE: DX on 45 Hz

Yes, 45 Hz, says Pat Hawker G3VA in TT, Radio Communication July '74. The Massachusetts Inst of Tech. in their Project Sanguine, he quotes, used two relatively "short" orthogenal crossed dipoles, each a mere 22.5 km long and with the ends grounded and have been putting decodable signals into Norway, Malta, Taipan and Hawaii on 45 Hz and 75 Hz. He goes on to comment that you cannot expect to modulate an elf signal with speech or even normal speed CW — the speed used was about 0.03 bits/s. I do not think anyone, he says, has got round to DC waves or negative "antiwaves" that might give us a whole new spectrum!

RECIPROCAL LICENSING — NEW ZEALAND

The NZART 1974 Call Book in a short "guide for overseas amateurs to obtain a New Zealand licence" advises that holders of **certificates** issued by VK, VE, G, EI, Cook & Nive Islands can be granted a licence by their PMG Dept. on payment of fee. The appropriate licence which would be issued is stated as —

(a) Grade III (i.e. VHF bands AM & FM) for those with less than 12 wpm morse;
(b) Grade II (i.e. 160, 80 and 6 m bands up) for these possessing 12 wpm but no evidence of operator experience;
(c) Grade I (i.e. full privileges all bands) for those with 12 wpm and proven experience.

The NZ exam could be taken in the usual way by those who wish to up-grade their licence. So if you hold a VK 10 wpm morse proficiency certificate beware when contemplating a trip to ZL-land. ●

ACE Awards

with Alex Slight, VK2ZA

Featured on the cover of AR for February of this year was the CHC Chapter 66 ACE 125 Award, with the caption 'who would be the first to win the same'.

The first ACE 125 Award was presented to Jack Evans VK2CX at the May meeting of the N.S.W. Division by Tony Mulcahy. The gent on the left of Jack is Alex Slight VK2ZA, President CHC Chapter 66.

Up to the present, four ACE 125 Awards have been awarded. They are No. 1 VK2CX, No. 2 VK2ZA, No. 3 VK4LZ, and No. 4 went to a SWL, Charles Thorpe, who also holds the Basic ACE No. 6.

In Charles' case this is no mean feat for a SWL, but it brings to light two very important points. Firstly, as a CHC SWL he apparently does the right thing. That is he includes a SASE with his own QSL card. Secondly, that the VK amateurs have done the right thing under these circumstances and have assisted him by return QSL confirmation.

Twenty-nine basic ACE Awards have been awarded. Ten of the awards have gone to New Zealand where it is tremendously popular. Almost any night you can find a net looking for Australian Electorates around 3.690-3.695 MHz, and generally hosted by George ZL4JP. If you are looking for information or a rare ZL County, this is a good spot to look.

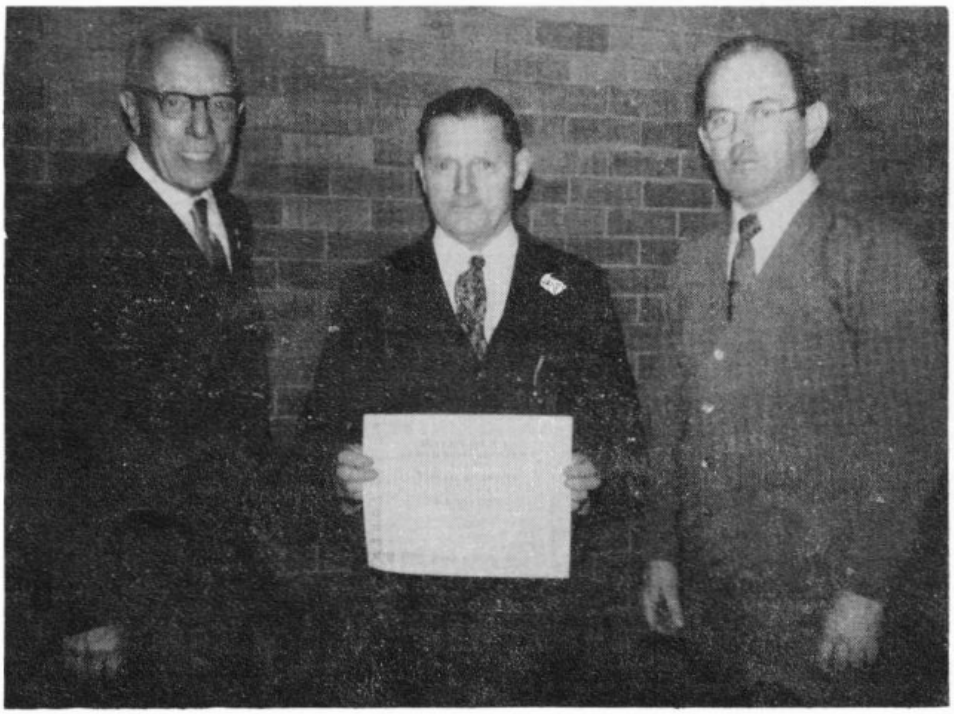
This also brings up another very important point, one which may well be overlooked by the VK boys; under ZL regulations there are many very active amateurs who can at present operate only on the 80 metre band. Many of these fellows are indeed most enthusiastic types but, being restricted to 80 metres, do not have the same opportunity to contact VK5 and particularly VK6 amateurs as do the other ZLs on 40 and 20 metres.

On their behalf we appeal to VK5s and VK6s to come up on 80 metres now and again, and give the ZL chaps at least a chance to try. It is realised that there is a four hour difference between WA and New Zealand but, during the winter time, 7 pm Western Australia is still only 11 pm in New Zealand. If they think there is the slightest chance they will be there trying.

It is suggested that a letter, some two weeks ahead of proposed 80 metre operation, be sent to ZL4JP by Air Mail. You can be sure he will see that it gets plenty of publicity; or you could ask some of the ZL boys on 40 or 20 to QSP to ZL4JP.

It is hoped that many more local and overseas fellows will receive the award, and congratulations go to the others who have already made the grade.

BELOW: Jack Evans VK2CX holds the first ACE 125 Award just presented to him by Tony Mulcahy at the May meeting of the VK2 Division. Looking on at the left is Alex VK2ZA.



REMEMBRANCE DAY CONTEST ADDRESS

By
SENATOR R. BISHOP, Postmaster-General

I am honoured to be invited by the Wireless Institute of Australia to open its 27th Remembrance Day Contest.

This contest is primarily a memorial to the 35 amateur wireless operators who gave their lives in World War II however, it also serves as an advanced training exercise in the important field of radio-communication.

Amateur Radio, today, is highly skilled activity and provides a reservoir of competent operators, who are internationally recognised, who relieve the stresses from Government services in times of emergency and who do much to promote better understanding between the peoples of Australia and other countries.

Looking beyond the next decade the alliance of computers and communications networks in conjunction with new technologies will provide the capabilities for a wide range of new services. The demand for mobile services of all kinds is likely to increase markedly.

Vast increases can be foreseen in the volume of information conveyed by transmission media, both guided and radiated.

New guided media, for example, optical fibres, could become the main conveyors of point to point transmission; radio being used predominantly for communication with moving objects.

It is likely that there will be great demand in the future for mobile telephone systems. Micro-miniaturisation and digital techniques could make pocket telephones a reality if a suitable and adequate spectrum can be found.

New techniques will be developed to exploit the upper reaches of the spectrum — perhaps higher capacity satellites.

Domestic satellite systems may eventually be expected to provide services for entertainment, education and welfare, and to give outback centres full access to National Telecommunications facilities.

Notwithstanding the rapid progress and specialisation of the electronic art, the amateur is keeping his equipment up-to-date, operating to international standards and himself ready and able to meet any emergency.

This contest, which I now declare open, is an exercise in skill, speed, efficiency and improvisation in simulating for 24 hours, an emergency communication network. It will demonstrate the valuable and specialised service that radio operators give unstintingly without expecting tangible reward.

I wish it every success. ●

VHF UHF
an expanding world
with Eric Jamieson VK5LP

Forreston, S.A., 5233
Times: GMT

AMATEUR BAND BEACONS

VK0	VK0RSA, Macquarie Island	x	52.160
	VK0MA, Mawson		53.100
	VK0GR, Casey		53.200
VK1	VK1RTA, Canberra		144.475
VK2	VK2WI, Sydney		52.450
	VK2WI, Sydney		144.002
VK3	VK3RTG, Vermont		144.700
VK4	VK4RTL, Townsville	x	52.600
	VK4WI/1, Mt. Mowbullan		144.400
VK5	VK5VF, Mt. Lofty		53.000
	VK5VF, Mt. Lofty		144.800
VK6	VK6VF, Perth		52.301
	VK6RTU, Kalgoorlie		52.350
	VK6RTT, Carnarvon		52.900
	VK6RTW, Albany		144.500
	VK6VF, Perth		145.000
VK7	VK7RTX, Devonport		144.900
VK8	VK8VF, Darwin		52.200
P29	P29GA, Lae, Niugini		52.150
JA	JA1IGY, Tokyo, Japan		52.500
3D	3D3AA, Suva, Fiji	x	52.500
ZL1	ZL1VHF, Auckland		145.100
ZL1	ZL1VHW, Waikato		145.150
ZL2	ZL2VHF, Wellington		145.200
	ZL2VHP, Palmerston North		145.250
ZL3	ZL3VHF, Christchurch		145.300
ZL4	ZL4VHF, Dunedin		145.400

x denotes change or addition.

On the subject of beacons I was rather perturbed to note the current listings for the Region 3 (including VK) beacons in the 1974 copy of the New Zealand Call Book which has just come to hand. The list is quite out of date, being taken from the January 1972 issue of "Amateur Radio", and DX-ers in both VK and ZL are warned to observe the above listing which is as correct as I can make it at the time of going to press. An airmail letter has been forwarded to the NZART giving a list of current beacons and frequencies in the hope a correction can be printed in "Break-In" in time for the coming summer DX season.

Further on the matter of beacons, your attention is drawn to the revised call sign of the Macquarie Island beacon. Talking to Keith, VK0MX at Casey on 20 metres recently, I was informed that VK0GR, the Casey 6 metre beacon on 53.200 MHz, is currently running 24 hours a day, using MCW to a 3 element yagi beamed on Australia, and 100 watts output. A recent tune-up of the beacon indicates it is still running well. Keith mentioned that probably the beacon on Mawson, VK0MA was also running well, also with 100 watts of MCW.

The Townsville beacon has changed call sign to VK4RTL; no news of any other current changes.

A contact with Eugene 3D2AZ of Suva, Fiji, on 20 metres recently also revealed the presence of an active beacon there, using the call sign 3D3AA on 52.500 MHz, running 24 hours a day with 50 watts from a 6146. At present the beacon is beamed to Honolulu for TEP checks, but it is hoped soon to increase the power to 250 watts and to employ a switchable antenna, possibly of the omni-directional type. Originally this beacon was used for TEP schedules between Fiji and Guam, but now the interest is centred on Hawaii. 3D2CM is custodian of the project beacon.

Eugene mentioned he was rather a lonely operator, despite being only 1½ miles from the beacon. He operates an FTV650 transverter to an FT101, using a 5 element yagi up 60 feet. He is able to operate 50 to 54 MHz, and keen to operate into VK, and will be watching 52.050 now that he has been informed of our listening frequency. He has had one 6 metre contact, that with ZL1IQ in March 1974 when his antenna was only two feet off the roof!! Heard the VK2WI beacon on one occasion, signals rising to S7, despite many calls on both 6 and 20 metres could not raise an interested soul — took quite a long time for his fingernails to grow to full length again! So there you eastern staters — look what you missed simply because you don't keep your ears on the band. Once again the words of Rod VK2ZQJ "Six metres never really closes, only the operators go to sleep". Incidentally, where were you, Rod?

THE COMING DX

Yes, its coming all right, and before long too. Both 6 and 2 metres will be really worth watching this year, and judging by reports received in various contacts of late, plenty of people are getting geared up for the DX. Ross VK4RO in Ayr, North Queensland, mentions quite a bit of interest in 2 metres in the north; amateurs in Mackay are getting geared up with 2 metres SSB or high power AM, Ron VK4EN using 4 x 10 el. yagis. Ross 4RO has an FT220 on order.

Over in Ceduna on the west coast of SA, Kerry VK5SU advises he is as keen as ever on 6 and 2 metres, also in the same camp is Noel VK5EI who is getting ready for 6m DX and building a 4 el beam. He also has a FTDX560 and FTV650, a 4 el 2m beam etc. etc. Also, Noel is very interested in 432 MHz ATV. He has a 432 Tx under construction, and hopes it will be ready by the end of the year, and will hopefully be looking for some ATV contacts with Adelaide then. He is keen to try FM on 2 metres to Adelaide as well, so remember the West you Adelaide boys. Kerry also mentions some linears for 2m being built in VK6, so looks like some good signals will be around this year. Bob VK5MM has started the ball rolling by working into VK2 and VK7 on meteor scatter during the Remembrance Day Contest; that's scoring the hard way!

SPECIAL

144 MHz opened up in Adelaide on 30th August. After many months of calling I worked three stations in Adelaide on 2 metres, VK5ZK, VK5ZPS and VK5QR, distance 25 miles!! Boy. Was I pleased to know my gear was still working!

REMEMBRANCE DAY CONTEST

Certainly a wonderfully satisfying contest to join in. I never heard one cross word on any bands HF and VHF during the contest, even several strong and broad HF interstaters were tolerated — surely these chaps with the audio gain they were using, would have been running close to 1 kW PEP input! Seemed like it anyway. VHF participation was again excellent, and the bedlam on the FM nets had to be heard to be believed, and full credit to those operators who amassed good scores from amongst the mess. Providing everyone co-operates and sends in their log there should be some very interesting results.

PORTABLE OPERATION

No information this month from anyone contemplating some portable operation over the Christmas/New Year break. Possibly my words last month might get a few stirring soon, but don't leave it too late to start getting the gear in order. I have selected two likely sites for my proposed portable operation, both of which have probably not been used before. Have yet to decide which one I will use. Several factors have to be taken into account, and it is hoped that by next issue the selected site will be known and passed on to readers and likely operators.

There seems little else to report for now, so will close with the thought for the month: "Marriage is an institution that turns a night owl into a homing pigeon".

The Voice in the Hills. ●

Intruder Watch
with Alf Chandler VK3LC

153[illegible] Street, Glen Iris, 3146

Further to my previous report regarding the identification of Red China stations intruding in our bands, the following signs used by them may be useful to Observers. The procedures used are slightly different in some ways to our own and can be identified by characteristic two and three letter signs analogous to our Q signals.

V — used to precede a call up and before the next call, e.g. — V ABC de XYZ V ABC de XYZ HJ K.
R — groups of these are used to "break in".
S — or a slow E E E indicates QRM.
W — used after a number, like 24W used to request repeat of numbered group.
CF and DB (not known to me as yet).
DE — This is used to request to identify.
HJ — commonly used, particularly in morse for "How do you hear me?". Also used in RTTY.
GP, QC, QK, TH (not known by me as yet).
TY — possibly like QRV, QRX or QSL. Also found in RTTY.
XH — followed by a number indicates QTC and number of messages on hand.
YH, YN, YR (not known as yet).
ZL — seen in RTTY.
ZBT — may be common operator's signal.
TBO — CQ for weather broadcast.
TBD, HGR, SQV (not known as yet).
PJS — Time zone.
KC is used instead of kHz.

Note the frequent use of 4 digit groups, also 4 letter groups. I guess that these are simple look-up numbers for the 10,000 Chinese characters and the letters are an encryption of them. The following extract from a letter received from Fred Laun may be also of interest to Observers —

"I happened to catch two tactical stations working each other and broke into their net in order to see what would happen. This was done by carefully zero beating one of the stations and sending groups identical to theirs. The sequence of their operations leads me to the following tentative description of their communication procedure and is quite uniform for all stations that have distinctive "two-tone" chirp as well as a great many others who exhibit varying degrees of signal quality. The one common feature of the signals is the hand-keyed sending. First the call-up procedure — "V WTL9 de Y85D HJ".

Second, after the stations have established contact, the term "XH" plus a number seems to indicate "QTC". Sometimes "TY" is used, and seems to be used when a station appears to have received a part of a message ok.

The manner of operation is full break-in, and should a station miss a group, he will send a series of rapid "R R R R" until he breaks the transmitting station. When the receiving station succeeds in breaking the transmitting station he asks for fills as follows — "24W" etc. The transmitter then repeats the group and makes a short pause, then continues. Should persistent interference be encountered the station encountering the QRM signals the other one by a slow "S" or "E E E". Should the interfering station sound like one of theirs they will then send "DE" which is a request for the station to identify itself.

A response using a home made tactical call such as theirs was made. This was answered by a request for me to wait ("AS" sent just as we would) and when the calling was persisted in, breaking their communication, they lapsed back into the "E E E" business and began to take evasive action, moving up and down the band without any apparent co-ordination, as though such evasive action is prescribed automatically as part of their procedure. When I persisted in following them they went QRX, returning in three to five minutes". ●

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

P.O. Box 87,
Bundoora, Vic. 3083

The Editor,
Dear Sir,

I refer to QSP on page 3 of August AR regarding intruders in the amateur bands.

With respect to VK3ZA it appears that he has hit the panic button over the recent distribution of pamphlets which urge the Australian Government to create a Citizens Band.

It is perfectly obvious that the Postmaster-General's Department is not going to be caught up with the 11 metre caper; however, if VK3ZA would care to look up the first article in a series on radio piracy by Roger Harrison (VK2ZTB) in the January, 1974 edition of Electronics International Today, he may possible take heart from one of the suggestions submitted to Roger Harrison — a proposal to establish a sophisticated type of Citizens Band in the UHF spectrum.

I disagree with VK3ZA where he insists that any person capable of sending CW at 20-25 w.p.m.

should be able to qualify for an amateur licence — without the 70 per cent theory pass, how is this possible?

Is it not then probable that many of those unanswered QSLs from CW contacts are directly attributable to our licensing conditions. Conversely, we have something like half of our Australian amateurs with limited tickets where in many cases the code is a stumbling block to DX operation.

A little more calm and a genuine attempt to understand the other guy's situation would pave the way to most — not all — of the answers.

M. R. Morris, L30134

The Editor,
Dear Sir,

Further to the excellent editorial in AR, August 1974, in particular the reference to the many commercial intruders who are using the amateur frequencies for their communications, I would like to suggest that the WIA "start the ball rolling" on a somewhat different approach than has been used in the past.

The Intruder Watch is very necessary and does an excellent job of logging many of these intruders, but in the main it is a long and sometimes hopeless process in getting rid of them!

Is it too much of a goal or challenge to suggest that we should be negotiating with the necessary Australian Government Departments to set up and operate a WIA controlled "jammer"! Sure, it has its difficulties and problems, but in co-operation with the Intruder Watch it could be very effective. There will be those who will say "it can't be done", but with co-operation of the ARRL, RSGB, JARL (right on the doorstep!) and amateur determination I feel that it can be done!

It may take some time, years in fact, but nothing ventured is nothing gained.

Personally I am prepared to back such a scheme financially and materially.

What do other members think?

Yours faithfully,

John E. Dunkley, VK5JE

The Editor,
Dear Sir,

In QSP of the August AR, John Bennett mentioned amongst other things the problem of piracy. I am fully aware that piracy exists, but I also feel that many acts of "piracy" are in fact accidents.

Whilst in Nigeria I operated a station for many years. One day I heard a European station talking to 5N2AAU — my station callsign. After the first shock I found that the station was in Lagos, the name was Joe — and in fact it was 5N2AAJ. Joe used the phonetic J — Juliet, but his accent made it sound like Yuliet, hence the mistake. I was able to work the European station and rectify the mistake.

Such mistakes on phone are well known to us. Whilst in U.K. I have the call G3YSO. I have had frequent cards which were found to be for G3YFO. Similar mistakes are easily possible on CW especially when an operator uses a bug key on VOX. I would suggest that John checks callsigns which are similar to his in Morse. I am sure he will find the "pirate" is properly licenced but improperly heard. 3ZA could easily be 2DA or even 40V with the occasional bit of static.

I once had a QSL card sent to me made out to 5N2ALT. The bureau manager had correctly interpreted the SWL's mistake, but then — he only had one Bill on his books.

Yours faithfully,

Bill Senior, VK2BZA

The Editor,
Dear Sir,

Further to the recent letter in this column (1) there is a lot of truth that the amateur is or should be an experimenter. This brings us to the point, why is the authentic experimenter denied the use of all amateur frequencies allocated to the amateur service to conduct his experiments because he has not studied the morse code (another language), and is therefore classed as a second-class or a limited amateur. In reality, he may be a first-class experimenter assisting in science technology or the advancement of electronics of our country, or even world wide.

On the other hand, the communicator either with his "black box" or well-designed home brew "rig" mainly interested in making contacts (QSOs) either in morse or voice, is just as important, being a very valuable ambassador for Australia; representing Australia to the rest of the world, by this side of his hobby called DX-ing, or he may be a contest king gathering rare cards, or "wallpaper" (2), thus narrowing international barriers and relations.

To obtain rare countries, naturally CW is one of the best means. It overcomes any language problem with the foreign amateur operator, therefore, with this high speed communication expertise, this type of operator is also a first-class amateur. This type of amateur who reads morse like another language you will find is **possibly** a postal or commercial telegraphist or an ex-military operator, therefore an o'd hand with a good fist. He being an old hand with a good fist. He being an expert in this (his) field, in the same way the technician-engineering type who carries out constructive and practical experiments. He is often involved in, or had engineering practice, and therefore equally an expert in this (his) field. Top amateurs in both fields are top or first-class men, ranging from top to bottom, with the average morse DX operator or experimenter, down to the newcomer in either field. In other words, there is a fairly defined line dividing the two fields, recognised professionally as signallers or technician/engineers. So far, so good, but where it comes to the existing amateur service regulations in this country and world-wide, the two classes are intermixed as it should be for the hobby to cover all tastes and shades of interest. Why should one expert be called second-class (LAOCP) when in his own right he is also a first-class amateur.

The writer, who formed a committee in Victoria (3), and Rex Black (4) who promoted the introduction of the novice licensing scheme here in this country, backing the Youth Radio Club Scheme, the new Novice (or third class) licence will provide the stepping-stone both for the technical and communicator type of new amateur. Our Novice licence provides the incentive to study further his theory, and increase his code speed, thus starting the newcomer on both or either path of expertise, which will become often the youngster's career, as well as his hobby.

Therefore, some thought should be given to perhaps a new arrangement of class of licences, to provide and overcome the shortcomings of the existing licence structure. I put forward such a workable plan that should give more freedom, and stimulate the pleasure and growth of healthy amateur radio in this country of ours.

What do you think? As a responsible reader, please forget, because you had to do it, so should all idea or thought.

Incidentally, the FCC (5) has proposed such a twin-tier plan or system of amateur radio licensing to provide for the extra class CW expert and the technical expert, in their incentive structure. This plan would provide to the signaller-communicator and the technician-engineer type, giving both the same status and privileges. Why should the competent experimenter be suppressed or rated second-class, in actual fact it is he who broke the UHF and microwave records, designed and pioneered our repeaters, built up parts for our Oscar Satellites, studied Transequatorial Scatter and Sporadic-E propagation, etc.

Instead of waiting for the FCC to lead the world in such a plan, why can't we Australian Amateurs provide a lead in the line of thought. We often quote that in Australia we have the highest standards, and qualifications to the rest of the world. The level of our present amateur examinations are of very high standard.

Finally, it must be realised, we also have some amateurs who are experts in both fields, not necessarily at the same time, but over their amateur life. Being excellent CW and SSB operators, and true experimenters and constructors providing amateur radio a valuable service, which licence would they take?

This letter to the Editor is to provide food for thought — do we need a dual system of licensing to cover both fields of amateur radio?

George Francis, VK3ASV/T

References:

(1) Letter by Cyril Maude, VK3ZCK, AR, June 1974.
(2) Certificates and Awards.
(3) Eastern Zone (VK3) Basic Licencing Committee for Victorian Division.
(4) Founder of the WIA YRCS, and chairman of the Federal Novice Investigating Committee.
(5) See QST March 1974 League Lines "dual-latter" proposal and no-code licence. (Page 15).

SUGGESTED PLAN No. 1

FIRST GRADE (FULL)	**COMMUNICATOR AOCP, 10 WPM,** (could be increased to 14 wpm, but not recommended) **PRESENT THEORY, ALL BANDS.**	**TECHNICAL NEW AOCP.** (to start 1975/6) Such as additional knowledge in RTTY, Repeater construction and operation, SSTV, FSTV, etc. (by permit perhaps). **NOVICE + LAOCP = NEW AOCP**
SECOND GRADE (LIMITED)	**NOVICE** 5 WPM. Segments of 3.6, 21, 27 MHz plus Dual Licencing	plus **LAOCP** Codeless, present theory, (Started 1952). Above 52MHz.
BASIC GRADE (NOVICE)	3.6, 21, 27, 52, 144 MHz and above. 5 WPM **NOVICE** (started 1974/5) Segments in 3.6, 21, 27 MHz bands. Tenature only.	

SUGGESTED PLAN No. 2

	COMMUNICATOR AOCP 10 WPM. Full Call, all bands, all modes.	**EXPERIMENTER/CONSTRUCTOR. LAOCP** plus **5 WPM.** (Actually the dual Licence). All bands, AM except CW on HF.
	LOCP NO CW. VHF ONLY.	
	NOVICE, Limit **5 WPM.**	

TECHNICAL CORRESPONDENCE

SOME DEEP THOUGHTS ON A REGULATED POWER SUPPLY

In the July 1974 issue of "Amateur Radio", the design details of a regulated power supply were discussed and a circuit diagram with component values produced. However, some very important points require careful consideration if people are to build similar units and have consistent reliable operation.

(1) The Author neglected the forward voltage drop across the diode in the bridge rectifier. Practice shows that a one volt drop occurs across each conducting diode and since two diodes conduct on any half cycle, then the maximum voltage from the rectifier using a 19Vrms transformer secondary will be:—

$V_{max} = V_{rms} \times 1.4 - 1 \times 2$
$= 27 - 2$
$= 25$ Volts.

(2) As stated, the input to the uA 723 C regulator must be +4.4V higher than the required output voltage to maintain regulation. If the required output voltage is 15 volts, then the minimum capacitor voltage is:—

$V_{min} = 15 + 4.4$
$= 19.4$ Volts.

(3) The discharge time will now be:—

$T = 5 + 1/18 \sin^{-1} V_{min}/V_{max}$
$= 5 + 1/18$ arsin 19.4/25
$= 5 + 2.85$
$= 8$ milliseconds (approx.)

(4) Substituting these new values:—

$$C = \frac{IT}{V_{max}-V_{min}} \times 100 \text{ uF}$$

(Where I is load current and in this case 15 Amps)

$$= \frac{15 \times 8}{25-19.4} \times 1000 \text{ uF}$$

$= 21{,}500$ uF
(an increase of 7,500 uF comparing this figure with that shown in the article)

(5) The worst case of series pass element dissipation occurs when maximum load current is being drawn from the supply at minimum output voltage. The power dissipation across the series pass elements is load current times the collector to emitter voltage.

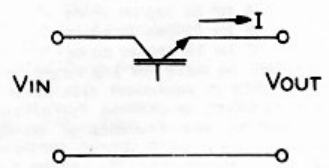


FIG 1

From Fig. 1 the power dissipation is:—
$P = (V_{in}-V_{out})\ I$
Where $V_{in} = \frac{V_{max} + V_{min}}{2}$ (approx. average DC voltage)

i.e. $V_{in} = \frac{25 + 19.4}{2}$

$= 22.2$
$\therefore P = (22.2 - 10)\ 15$
$= 180$ watts (approx)

Hence as stated in the article, if 3 elements are used, each element must dissipate 60 watts.

(6) Now we come to the heatsink design. The collector junctions of the series pass elements will run at high temperatures due to power dissipation. Fig. 2 shows that this heat energy must travel through three thermal resistances before it reaches the ambient air. The three thermal resistances are:—

Any thermal resistance is equal to the temperature drop across it divided by the power dissipation:—

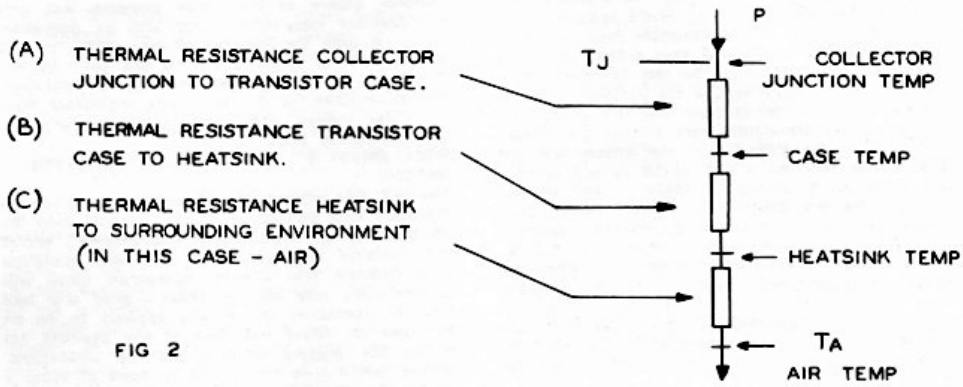


FIG 2

i.e. Rth = T/P
and we can write a "Thermal" Ohm's Law — T = P.Rth where T is expressed in °C, P in watts and Rth in °C/W.
compare this with Ohm's Law. V = IR
Also from Fig. 2 we see that the junction temperature (Tj) is the sum of the ambient temperature (Ta) plus the temperature differentials heatsink to ambient (Ths-a), transistor case to heatsink (Tc-hs) and collector junction to case (Tj-c).
i.e. Tj = Ta + Ths-a + Tc-hs + Tj-c
The thermal resistance transistor case to heatsink can be minimised by the addition of a thin smear of silicon compound between the case and the heatsink. However mica washers are used for insulation purposes and this thermal resistance must still be considered. It is generally taken as 0.5 °C/W.
From the 2N3055 data sheet we find that the maximum allowed junction temperature (TJmax) is 200°C and thermal resistance collector junction to case is 1.5°C/W, and as stated in the article a 6" piece of 'Miniwatt 35D' heatsink will rise 80° above ambient whilst dissipating 60 watts.
Now, if the ambient temperature is not expected to exceed 50°C (120°F) then:—
Tj = 50 + 80 + 60 (0.5) + 60 (1.5)
= 50 + 80 + 30 + 90
= 250°C
= destruction! (contrary to the article)
See Fig. 3.

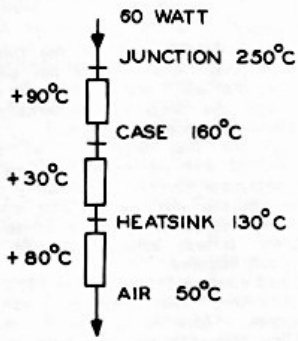


FIG 3

In fact if five transistors are used, each dissipating 36 watts, working back we find:—
Ths-a = Tjmax — Tj-c — Tc-hs — Ta
= 200 — 36 (1.5) — 36 (0.5) — 50
= 78°C
and the 'Miniwatt 35D' data sheet shows a 3" piece of heatsink could be used.
If you are keen on using only 4 series pass elements then a much more elaborate heatsink is required. Calculations show we need to dissipate 45 watts with a 60°C heatsink temperature rise. A 2" piece of 'Miniwatt 55D' heatsink will suffice. For those keen on using 3 series pass elements, each will need to be mounted on a 12" piece of 55D heatsink. This is cost prohibitive and physically ridiculous. The best compromise is probably 4 transistors each on a 2" piece of 'Miniwatt 55D' heatsink.

(7) Now a word of warning about dissipation of the power driver. Once again its worst dissipation case is at maximum load current together with minimum output voltage. From the 2N3055 data sheet the minimum current gain is 20 and therefore the driver emitter current could be as high as 15/20 amps. Its collector dissipation will be approx:—
$P = 12 \times 15/20$
$= 9$ watts
Quick calculations show we require a heatsink with a thermal resistance of 15°C/W. We can obtain this by bolting the driver to the power supply case.

(8) Worst case dissipation of the uA 723 C also occurs at maximum load current with minimum output voltage. Calculation shows this to be approx. 360 milliwatts. The uA 723 C data sheet shows this figure to be well within the dissipation figures at 25°C. These are:—
dual in line package (DIP) 900 mW.
metal can 800 mW.
However we must apply a derating factor of 6.8mW/°C for the metal can and 9mW/°C for the DIP for operation at ambient temperatures above 25°C (from uA 723 C data sheet) i.e. at 50°C internal dissipation cannot exceed:—
DIP 675 mW.
Metal can 630 mW.
Hence there is no problem until we come to the possible situation of point (9).

(9) Finally, a word of warning when this type of supply is operated at maximum load current. If for any reason the load is increased (possible load short circuit) the current limiting action will still hold the output current at 15 amps but the output voltage will fall away toward zero. In this case the excess voltage (approx. 22 V) will appear across the series pass elements and the power dissipation will be 330 watts (far in excess of the normal 180 watt figure used in heatsink design calculations). The dissipation ratings of the uA 723 C will also be exceeded under these conditions! So watch your output voltage! A 15 amp fuse before the filter capacitors would protect the rectifiers and a 2 amp slow blow fuse in the transformer primary circuit would afford the overall unit better protection.

I suppose some people will still be non-believers in fact as the author said, "The prototype has now been in operation over 12 months", and he also goes on to say that about half a dozen other units are in operation around the town.

The unaccounted diode volt drop and the understated value of filter capacitance could in some cases be overcome by the fact that an average commercial grade electrolytic capacitor has a tolerance range of —50% to +100%. The negative tolerance would make matters worse but since the total capacitance value of 14,000 uF was probably made up of several 2,000 uF capacitors in parallel and as the majority tend to exhibit a large positive tolerance, then more than likely the Author ended up with much more than his 14,000 uF.

As for the heatsink problem, it is highly unlikely that the supply has ever run supplying 15 amps at 10 to 12 volts for prolonged periods, otherwise destruction would have been inevitable. It should

be noted that for any reduction in ambient temperature, then all temperature levels reduce by the same amount, i.e. if the collector junctions were running at 170°C under load, then a 20°C reduction in ambient temperature (colder day or operation in a cooler room) would reduce the junction temperatures to 150°C. Under medium load this would help save the power transistors from thermal destruction.

Indeed as the Author said, the article was not intended to describe a unit to be copied exactly, but more as a source of ideas. I will release through the Moorabbin and District Radio Club details of a regulated supply continuously variable from 0-15 volts with load regulation of 0.03%, ripple rejection better than 76 db and with two ranges of current limit, each continuously variable from 0-1 amp and 0-10 amps. The supply can either operate in constant voltage or constant current mode and will incorporate remote sensing. Details will be offered for publication in "AR" at a later date.

Adrian E. Mensforth, VK3ZCM,
5 Newbury Court, Ashwood, Vic. 3147●

Try This

with Ron Cook VK3AFW
and Bill Rice VK3ABP

ANTENNAS CAN CAUSE INTERFERENCE

Some texts on radio interference state that antennas cannot cause interference, but only radiate what is fed to them.

This may be true in theory but if you are causing interference it is a good idea to check your antenna. I have twice discovered the same cause of interference, once in VK4 and once in VK3. The antennas in question were both ZL specials made with 300 ohm TV ribbon. In each case a few strands of wire had broken at the feeder connection. Antenna performance was quite normal but once the broken strands became oxidized they acted as rectifiers and generated interference.

No doubt this can happen with any other metal connections, not necessarily part of the radio installation. Still it is well worthwhile checking your antenna and perhaps save a lot of effort looking elsewhere.

M. N. O'Burtill, VK3WW●

PROJECT AUSTRALIS

ARRL AND AMSAT V FCC

Readers of QST and other American magazines will have noticed the steadily increasing regulation of amateur activities in the US by the FCC. Repeater regulation in particular has felt the "heavy hand" in recent times. Now the FCC has turned its attention to the satellite service and has announced its intention to conduct an inquiry into this facet of amateur activity to see if further specific rules and regulations are required.

From an International point of view this is of a more serious nature than the majority of the FCC's actions. As the launching authority for all Oscars in the foreseeable future any undue restriction on future satellite operation by the FCC will have a drastic effect on the rest of the world, if only in the choice of sub-systems to be flown. With this in mind the ARRL sought the views of other interested national bodies before determining its own attitude to the inquiry.

Those countries that had replied before the deadline of the June issue of QST were unanimous in their opposition to further specific satellite operation regulation. The WIA position, as formulated by FE earlier in the year, was quoted at length in QST and attention was drawn to the consistency of the international replies along the lines stated. The ARRL in its efforts to keep the FCC on the rails is heavily stressing the international nature of the Oscar projects, not only in hardware development but also in operation. To quote from the editorial of June QST: "In fact 90 per cent of Oscar 6 control has been by VE, D, VK and ZL stations. So established co-operation, not more rules, is the necessary ingredient here . . . Yes indeed, this matter is substantially one of international effect".

FCC!, AMSAT 0 . . . the OSCAR 7 2304 MHz BEACON

The FCC has refused AMSAT permission to operate the 2304 MHz beacon on Oscar 7 whilst over the US because of "International implications". Whilst this decision need not affect 2304 MHz operation over Oceania (the internal spacecraft clock will automatically turn off the beacon after one half hour of operation) the writing appears to be on the wall for future operation of any beacons not within the present amateur satellite allocations. Whilst Australis is not giving up hope of flying a future VK 1296 MHz beacon the prospects of this project are bleak at this stage.

VE-VK CO-OPERATION

Australis was kindly sent a copy of the VE Oscar newsletter recently. This worthy publication highlighted the extensive technical co-operation that has existed between the VK and VE amateur satellite groups in the joint development of a computer controlled command system for future Oscars. In fact, whilst most of the design and development work for this project has been done in this country, it has been funded almost exclusively by donation of components by VE amateurs. Some of these items — such as microprocessors — are almost unobtainable in VK, certainly on a sample basis. Co-operation of this order between two groups on opposite sides of the world can only generate goodwill not only for the Oscar projects but for all of Amateur Radio. ●

Contests

with Jim Payne, VK3AZT
Federal Contest Manager,
Box 67, East Melbourne, Vic., 3002

CONTEST CALENDAR

Oct	5/6	VK/ZL Oceania Phone
Oct	12/13	VK/ZL Oceania CW
Oct	12/13	RSGB 21/28 MHz Phone
Oct	19/20	RSGB 7 MHz CW
Oct	19/20	Scout Jamboree
Oct	26/27	CQ WW DX Phone
Nov	2/3	RSGB 7 MHz Phone
Nov	10	Czechoslovakian CW & Phone
Nov	23/24	CQ WW CW

WHEN IS YOUR CLUB OR DIVISION HOLDING A CONTEST?

RD CONTEST

Firstly, the comment made in the Contest Notes for August that "one contact per band for HF means just that etc." was an error. It contravened Rule 5 and the resulting consternation and inconvenience is sincerely regretted.

One of the first logs received came from Harold VK3CM who commented, "Many thanks for a very enjoyable contest. It certainly brings back memories of the war years. Most stations were very strong indicating good adjustment of their transmitters. It was quite a surprise to contact so many CW stations".

VK6J has claimed 616 points for 132 CW contacts and commented, "Thank you for a very enjoyable first contest, I look forward to the next". Peter VK4PJ, our former contest manager, wrote shortly before departing for a short holiday in USA, "The RD went off pretty well by all accounts. The VK5s were going very strongly . . . onto the VK4s like hawks . . . on to me anyhow. All reports indicate that the contest was friendly . . . 80 metres a bit disappointing . . . but 40 pretty good from here to make up. 20 was good to me and some good contacts to VK6 who seemed to be working all over the place and should do well. Spent some time calling on 10 metres as did a VK6 without any success. I am sure the CW double points was received".

ROSS HULL CONTEST

As mentioned last month Bob, VK3AOT's suggestions about scoring were circulated to a number of contestants and this has generated a great deal of correspondence. Distributing this to all interested amateurs is not practicable but some copies will be prepared and circulated when time permits so that differences of opinion may be discussed and the rules and/or scoring table for 1975/76 amended to the extent of any agreements reached.

The distance table which was published in AR, Nov. 1971, has been converted to kilometres and it will be printed and distributed as soon as practicable.

1973 CQ WW CONTEST

Results by airmail from Frank, W1WY.

		PHONE			
		Australia			
VK3ARY	**A**	**44,352**	**192**	**26**	**51**
AX3SM	**21**	**24,150**	**193**	**13**	**29**
AX3XB	**3.8**	**392**	**22**	**3**	**4**
VK4VU	**A**	**780,340**	**1226**	**77**	**143**
AXFH	,,	168,074	572	37	64
VK4UA	,,	49,176	249	33	39
VK4DO	**14**	**42,280**	**197**	**30**	**59**
VK4AK	,,	26,363	103	30	67
VK4PJ	,,	176	6	5	6
AX5MF	**A**	**46,475**	**246**	**44**	**83**
VK6NE	A	8,262	54	25	29
VK6TU	,,	3,063	33	15	19
VK6CT	**7**	**135,810**	**521**	**29**	**61**
		CW			
		Australia			
VK2GW	**A**	**302,874**	**729**	**61**	**82**
AX2BQQ	,,	19,136	103	23	41
VK2BKM	**14**	**247,244**	**755**	**30**	**83**
VK3BRC	A	1,924	21	14	18
AX3KX	**21**	**84,168**	**456**	**22**	**41**
VK3APN	**7**	**62,814**	**360**	**23**	
AX3XB	**3.5**	**5,080**	**88**	**11**	
VK4ZV	**A**	**294,765**	**779**	**53**	**76**
VK4XW	,,	1,920	26	16	16
VK6RU	**A**	**26,082**	**144**	**28**	**35**

ZIP CODE CONTEST

This is a new contest organised by the S.E. Virginian Wireless Association. The scoring system is based on the total sum of the last two digits of the Zip Code worked i.e. 23518 is worth 18 points. This unique system, which could be adapted to our postcode system, should make some stations very popular. ●

Awards Column

with BRIAN AUSTIN VK5CA
P.O. Box 7A, Crafers, SA, 5152.

WORKED ASIAN CAPITAL CITIES, (AHC AWARD)

The V.C.R.C. in Vasteras, Sweden, issues the WASCC Award to any amateur and SWL in four classes:

AA for 40 capital cities
A for 30 capital cities
B for 20 capital cities
C for 15 capital cities

Endorsements will be made for any single band or mode. Fee: 10 IRCs or equivalent. QSL cards need not be sent. However, a certified list of claimed contacts, signed by two amateurs or an official club is required.

Address:

Urban Eugenius, SM5BTX,
Patrull-gatan 6, S-72347 VASTERAS, Sweden.

Asian Capital Cities: Afghanistan/Kabul, Bahrein/Mamana, Bhutan/Thimba, Burma/Rangoon, Cambodia/Phnom Penh, Ceylon/Colombo, China/Peking, Cyprus/Nicosia, Formosa/Taipeh, Hong Kong/Hong Kong, India/New Delhi, Indonesia/Djakarta, Iran/Teheran, Iraq/Baghdad, Israel/Jerusalem, Japan/Tokyo, Jordan/Amman, South Korea/Seoul, North Korea/Pyongyang, Kuwait/Kuwait, Laos/Vientiane, Lebanon/Beirut, Macao/Macao, Malaysia/Kuala Lumpur, Maldive Is/Mahe, Mongolia/Ulan Bator, Muscat & Oman/Muscat, Nepal/Katmandu, Trucial Oman/Dubai, Pakistan/Islamabad, Philippines/Quezon City, Qatar/Doka, Saudi Arabia/Riyadh, Singapore/Singapore, South Yemen/Hadinat ash Sheb, Syria/Damascus, Thailand/Bangkok, Turkey/Ankara, South Vietnam/Saigon, North Vietnam/Hanoi, Yemen/Saana.

THE SEVENTY-THREE AWARD (AHC AWARD)

The North Japan DX Club (NJDXC) will award an attractive certificate attesting honorary membership to any licensed amateur having made two-way communication with the prefix "7" in three countries in each continent (i.e. 3 x 6 = 18 QSOs), plus three members of NJDXC.

Any band may be used, CW or phone or mixed.

All contacts must have been made since 1st January 1953.

The application must be accompanied by the 21 QSL cards, a list of claimed contacts, and 10 IRCs, and it should be sent to:

NJDXC Awards Manager
G.P.O. Box 70
Sendai, Miyagi, Japan.

The award is available also to SWLs.

NJDXC members: **JA7** AD FC JH JI KW MJ MN OD.

D.X.C.C.

Announcement is made of the deletion of Tibet (AC4) and Zanzibar (5H1) from the ARRL Countries List. Any contacts made June 1st 1974 and after with stations located in Tibet will be creditable toward the China (BY) listing, while contacts with stations located in Zanzibar will be creditable toward the Tanzania (5H3) listing. (QST June 1974)

The following stations have qualified for Awards since the last list was printed:

W.A.V.K.C.A.

Cert. No.		Cert. No.	
583	ZL4JP	597	JA1AJA
584	YJ8DE	598	JA7TI
585	UK2FAD	599	DJ0YD
586	JA7JW	600	ZL3UF
587	JA7CYC	601	JA1JKG
588	JA1RRU	602	JA2KLT
589	ZL1ACL	603	JA6TTO
590	JA3MXR	604	GM3HGA
591	WA6SOV	605	OK1TA
592	JA1WVK	606	ZL1IO
593	JA1BNW	607	UA1CS
594	G3TJW	608	JA2RGH
595	JA0GRF	609	JA2HGA
596	F6ACV		

W.A.V.K.C.A. (V.H.F.)

Cert. No.		Cert. No.	
7	VK3BFG/T	90	VK3BFG/T
8	VK3ZAZ	91	VK4ZMI
		92	VK3ZAZ

W.A.S. (V.H.F.)

Cert. No.	
110	VK4ZMI
111	VK3ZAZ

THE "SURPRISE" STORY

12NSF/MM Ambrogio Fogar, in his yacht SURPRISE, left Italy November 5th, 1973. His aim was to sail around the world from East-West solo. He is probably the first Italian to attempt this voyage.

December 26th:
Arrived in Rio de Janeiro after an uneventful journey across the Atlantic Ocean.

January 2nd, 1974:
Left Rio for Cape Horn.

January 27th:
Rounded Cape Horn.

February 3rd:
Caught in a 90 mph storm 900 miles west of Chile, "Surprise" flipped upside down. All equipment ruined, daily contact with all amateurs ceased. ZL1BAK requested to give radio watch assistance and search and rescue alerted.

March 1st:
"Surprise" holed by playful whale. Emergency repairs to keep afloat.

April 9th:
Arrived in Auckland.

May 11th:
Left Auckland to travel south of Australia. New Swan SS200 transceiver and hustler antenna installed by ZL1AQE Des, and ZL1BAK. Ship repaired and restocked.

May 25th:
"Surprise" hit by worst storm around Australia, Ambrogio swept overboard on lifeline, "Surprise" capsized and Ambrogio able to reboard the "Surprise". All the equipment ruined again.

May 26th:
Ambrogio failed to keep daily schedule. ZL1BAK, VK4LZ, VK3OL, VK3UX, YJ8EE, VK3BH/aero mobile, maintained continuous watch, marine operations centre, Canberra, notified.

May 27th:
"Surprise" sighted heading for Sydney in good order.

June 5th:
Left Sydney heading south. Radio and antenna repaired by courtesy of Sydney VK's and A.W.A. Caught in storm, decided to sail north.

From then on, reasonable sailing conditions until the hazards of the Great Barrier Reef were encountered. From Torres Strait across the north of Australia, good weather gave the "Surprise" a good speed. July 21st, 2100 miles west of Australia. Assistance given by amateurs in New Zealand and Australia has been invaluable and contributed to the success of the voyage around Australasia.

On behalf of Ambrogio and myself I wish to thank all those ZLs and VKs who have assisted in this operation. Special mention must be made of the following:

ZL1RO (Gus) for daily watch and sailing information. ZL1AQE (Des) for radio repair and installation. ZL1BR, ZL1BHK, ZL1NX, ZL1BBH, ZLZBAD, ZL4BC for standby and relay. VK4LZ (Les) for VK co-ordination, daily watch, sailing information and relay. VK3OL and VK3UE for daily watch. VK2ALK for watch and assistance with radio in Sydney. YJ8EE/VK7 and VK3BH for search assistance. VK3UX, VK3ABY, VK3MH, VK3AXQ, VK3AIH, VK2ATC, VK2XD, VK2BZV, VK2ALH, VK2AJL, VK2BIG, VK2BGK, VK5AH, VK5QX for standby.

Mention must be made of the many radio amateurs who have given a clear frequency and stood by patiently ready to assist.

Relay assistance from the "Galileo Galilei" Italian Passenger Liner with the aid of Francesco and his radio officers, gave Ambrogio great pleasure.

I believe that publication of this information and the letter enclosed would in some way be a token of appreciation of the service of all radio amateurs.

Den Burrage, ZL1BAK
NZ Co-ordinator for 12NSF/MM

LEGA NAVALE ITALIANA
Sezione di Milano, Corso di Porta Romana, 17
Tel. 879762, C.ce Postale 20122
Milano, 12 luglio 1974

Den Burrage, ZL1BAK,
New Zealand Co-Ordinator,
12NSF/MM.

Dear Mr. Burrage,

I have just received your letter, and I must say that I read it not only with great pleasure, but with a certain amount of emotion too.

Since I have been responsible for radio-aid and public relations for many Italian sailors who, in the last few years have had the spirit to undertake oceanic trips, it is not the first time, and I do not imagine it will be the last, that I have observed the unselfish devotion to the task which radio amateurs throughout the world feel called to. When somebody needs a helping hand, or a friendly word, or is in danger of losing their own life, in times of danger, it is always to the radio-amateurs that they feel they can turn to.

Ambrogio, not only in this part of his important trip around the world, has drawn courage and received useful information from the short-wave radio transmitters manned by radio-amateurs, and through them he has always been able to keep in touch with his home, with those close to his heart, with his land, and with the many people throughout the world who have been following his progress. When he left Italy in November 1973, Brazilian and Angolan stations operated together with Italian radio-amateurs; after Rio de Janeiro, the Uruguaians, Argentinians and an important station in Santiago Chile took over, and they followed Ambrogio's progress during the most dramatic phase of his trip around Cape Horn. At Auckland, I know how closely the New Zealand and Australian radio-amateurs kept contact with him and how much brotherly affection he found in your far-away country, that so few of us have had the good fortune to visit.

I would like, in the name of all Italian sportsmen, and of all people who are following this lonely and courageous navigator's voyage, to thank individually all radio-amateur stations of New Zealand and Australia. In your wonderful letter you have given me the names of various stations which I am keeping for Ambrogio's dairy: please send to each and every one of them a copy of these QSL of Ambrogio's trip around Cape Horn.

I imagine they would want to have a souvenir of a man, who in these troubled times, has tried in his adventure with the sea, the most powerful and difficult of all elements, to test his personal courage and to rediscover the essence of living.

With my kindest regards,

E. A. PRATELLA

To:
The Wireless Institute of Australia, P.O. Box 2611W, Melbourne, Victoria, 3001 — Australia.
VK4LZ / VK3OL / VK2ALK / YJ8EE/VK7 / VK3ABY / VK2BZV / VK2ALH / VK3BH / VK2BIG / VK3MH / VK5QX / VK5AH / VK2AJL / VK3AXQ / VK2BGK / VK3AIH / VK2ATC / VK2XD.
NZART, Box 1733, Christchurch — New Zealand.
ZL1RO / ZL2BAO / ZL1NX / ZL1BHK / ZL1BR / ZL4BC / ZL1BBH. ●

TOWNSVILLE PACIFIC FESTIVAL CONTEST 1974 — RESULTS

PHONE SECTION			
VK2BYC	390	VK5HN	79
VK4MM	281	VK2BIP	66
VK4QO	250	VK2BHV	65
VK4DT	234	VK4QW	65
VK4LT	222	VK5LM	59
VK3ANM	180	VK4ZDB	56
VK3ARY	155	VK4PJ	50
VK4RR	135	VK4GI	49
VK3AYL	132	VK3BK	46
VK3TK	124	VK3BER	45
VK4CR	123	VK4GS	45
VK4KW	101	VK2BCG	31
VK4NU	99	VK4NB	28
VK4XZ	92	VK2BMX	27
VK2OW	90	VK1QJ	24
VK5RK	90	VK5ZX	24
VK6KB	82	VK5KL	14
VK2LS	80	VK6DG	12
VK4BG	79		
OPEN SECTION			
VK4LZ	**696**	VK6WT	280
Trophy winner		VK4LT	243
VK4TL	419	VK4PV	162
VK4HE	351	VK4RF	157
VK4FH	347	VK5LI	120
VK3WW	327	VK4VA	103
VK3XB	321	VK4QD	102
VK3VF	292	VK4PS	91
CW SECTION			
VK3CM	184	VK4VO	38
VK4KX	162	VK1DC	122
VK5DL	88	VK1DA	52
VK7RY	52	VK8HA	118
RECEIVING SECTION			
L-4018	542	L-40498	10
L-30042	190	L-50087	79
L-40506	79	P. J. Elliott (VK2)	34
Ross Inglis (VK4)	29		

●

QSP

AWARDS DIRECTORY

The Publications Committee believe it would be useful to publish a complete list of the various Awards (other than those which already appear in the Call Book) issued by various clubs and bodies in Australia. Could the readers of this please ask the issuers of any such Awards to send details (and specimens) to the Executive Office as early as possible for inclusion in the Awards Directory. This includes all those which had previously been publicised in AR because there may have been subsequent amendments or deletions.

TALK THROUGH THE TOP OF YOUR HEAD

Not quite, says Pat Hawker in Radio Communication July '74 in TT, but he describes an ingenious technique developed as "Earcom" devices by a company in California. The "Earcom" combined headphone and microphone was a single small transducer in the outer ear both as ear-piece to bring the signals in and a microphone to pick up voice energy at the ear from the total otolaryngeal system providing clear individually recognisable speech. Of course, he says, whether you speak more sense out of the top or side of your head than off the front or back depends on you.

I.A.R.U. REGION 1

Advice has been received that the next IARU Region 1 Conference will be held in Warsaw during May 1975. ●

Ross Hull VHF-UHF Memorial Contest 1974-75 rules

The Wireless Institute of Australia invites Amateurs and Short Wave Listeners to join in this annual contest which is held to perpetuate the memory of Ross Hull, who did so much to further VHF-UHF.

A Perpetual Trophy is awarded annually for competition between members of the Wireless Institute of Australia and is inscribed with some details of the man the contest honours.

The name of the winning member of the Wireless Institute of Australia for each year is inscribed upon the trophy and that member also receives a suitably inscribed certificate.

Objects. Amateurs from Australia and Territories will endeavour to contact as many other Amateurs as possible under the following conditions:

Date of Contest: 6th December, 1974, 1401 GMT, to 19th Jan. 1975, 1400 GMT. (0001 Hours E.A.S.T. 7th December 1974 to 2400 Hours E.A.S.T. 19th Jan. 1975.

Duration. Any seven calendar days within the dates mentioned above which need not be consecutive. These periods are at the operators convenience. A calendar day is from 1401 hrs GMT to 1400 hrs GMT.

RULES

1. There are two Divisions, one of 48 hours duration and the other of seven days duration. In the seven day division there are four sections:
(a) Transmitting, open.
(b) Transmitting, 'phone.
(c) Transmitting, CW.
(d) Receiving, open.

In the 48 hours division the best score over any consecutive 48 hour period is the winner.

In the seven day division the best score over any seven days of the Contest is the winner.

2. Any Amateur operating fixed, mobile, or portable within the terms of his licence may participate.
3. All Amateur VHF-UHF bands may be used but cross band contacts are not acceptable. At any one time, single frequency operating only is permitted. Cross mode contacts are permitted.
4. Amateurs may enter for any one of the sections and either or both divisions. The seven day division winner is not eligible for the 48 hour division award.
5. Two contacts per band per day, irrespective of mode, are permitted provided that two hours elapse from the previous contact with that station on that band.
6. Logs from a multi-operator station are not acceptable. One operator only may operate a station at any one time and must submit a log for his own operation.
7. Entrants must operate within the terms of their licence.
8. The exchange of RS or RST reports with serial numbers beginning with 001 shall be proof of contact.
9. Entries should be set out on quarto sheets, using one side of the paper only, and must be forwarded to reach the Wireless Institute of Australia, Federal Contest Manager, Box 67, East Melbourne, 3002, in time for the last opening of logs on Friday 21st February 1975. Envelopes should be clearly marked "Ross Hull Contest". Early logs are appreciated.
10. Scoring will be based on the attached table and the table of distances published in the Contest column of this issue of AR. Approximate distances are to be shown in the log. Operation via repeaters or translators is not permitted.
11. Logs should be set out as in the example and must carry a front sheet with the following information:

Name .....
Address .....
.....
Section .....
Callsign .....
Claimed 7 day score .....
Operating dates .....
Highest 48 hour score .....
Operating period .....
I hereby certify that I have operated in accordance with the rules and spirit of the contest .....
Comments .....

12. All times are to be logged in GMT only.
13. Certificates will be awarded to the winners of each section of each call area. Certificates will be awarded to contestants who break any Australian VHF-UHF distance records.

The VK Contestant who returns the highest score in the transmitting section and who is a member of the WIA will have his name inscribed on the trophy which will be held by his Division for the prescribed period.

A certificate will be awarded to the operator with the highest 48 hour score.

RECEIVING SECTION

1. Short wave listeners only may enter for this section.
2. Contest times and logging of stations will be the same as for the transmitting section except that there will not be a 48 hour Division.
3. Logs must show the callsign of the calling station, the serial number given, and only the callsign of the other station. Scoring will be as for transmitting stations.
4. Any scoring contacts may be logged. There no limit to the number of times that a station may be logged provided serial numbers are given.
5. The logs for any 7 days (calendar) may be submitted and the winner of the section will be the highest scorer.
6. Certificates will be awarded to the highest scorer in the contest and if sufficient interest is shown, to State winners.
7. A certificate will be awarded to the club station with the highest 7 day score.

General

It is preferable that complete logs be submitted as an aid to checking but contestants must clearly show their best 7 days or 48 hours. Enjoy yourself in another Friendly Contest. Try and exchange names with each contact.

DISTANCE TABLE FOR ROSS HULL MEMORIAL VHF CONTEST

The mileages shown in the table published on P.18 of Amateur Radio, Oct. 1973 have been multiplied by 1.609319 to produce the following metric table. Accuracy: Plus or minus 3 km.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	0	1886	1333	3249	1610	959	3066	2633	2940	634	1162	1036	657	380	1236	2137	1730	1159	1928	3223	1123
2	1886	0	1988	5055	3433	2832	4730	2826	4533	2391	2680	2643	2438	2070	3122	385	3405	3043	3338	4942	3005
3	1333	1988	0	4162	1962	1959	4166	1302	4103	1897	2469	2325	1891	1707	2028	1997	1701	2031	1429	4260	2034
4	3249	5055	4162	0	2308	2308	760	5161	1059	2670	2427	2428	2630	2993	2142	5356	2766	2163	3360	486	2176
5	1610	3433	1962	2308	0	964	2528	2853	2848	1450	1812	1661	1390	1638	636	3618	504	758	1101	2525	818
6	959	2832	1959	2308	964	0	2213	3153	2145	526	861	703	467	798	359	3096	1336	241	1806	2329	18
7	3066	4730	4166	760	2528	2213	0	5298	309	2438	2050	2103	2414	2747	2168	5065	3026	2144	3627	306	2134
8	2633	2826	1302	5161	2853	3153	5298	0	5279	3175	3753	3603	3162	3006	3132	2662	2424	3167	1880	5345	3188
9	2940	4533	4103	1059	2848	2145	309	5279	0	2308	1868	1939	2288	2602	2152	4878	3083	2111	3677	616	2092
10	634	2391	1897	2670	1450	526	2438	3175	2308	0	579	428	63	322	884	2686	1746	769	2123	2609	713
11	1162	2680	2469	2427	1812	861	2050	3753	1868	579	0	166	602	788	1178	3014	2195	1056	2638	2268	993
12	1036	2643	2325	2428	1661	703	2103	3603	1939	428	166	0	443	673	1032	2966	2034	908	2472	2303	846
13	657	2438	1891	2630	1390	467	2414	3162	2288	63	602	443	0	369	824	2728	1691	708	2071	2578	652
14	380	2070	1707	2993	1638	798	2747	3006	2602	322	788	673	369	0	1138	2364	1860	1033	2155	2924	983
15	1236	3122	2028	2142	636	359	2168	3132	2152	884	1178	1032	824	1138	0	3363	1070	124	1603	2424	186
16	2137	385	1997	5356	3618	3096	5065	2662	4878	2686	3014	2966	2728	2364	3363	0	3537	3294	3402	5267	3260
17	1730	3405	1701	2766	504	1336	3026	2424	3083	1746	2195	2034	1691	1860	1070	3537	0	1176	603	3011	1231
18	1159	3043	2031	2163	758	241	2144	3167	2111	769	1056	908	708	1033	124	3294	1176	0	1693	2229	63
19	1928	3338	1429	3360	1101	1806	3627	1880	3677	2123	2638	2472	2071	2155	1603	3402	603	1693	0	3613	1740
20	3223	4942	4260	486	2525	2329	306	5345	616	2609	2268	2303	2578	2924	2424	5267	3011	2229	3613	0	2229
21	1123	3005	2034	2176	818	186	2134	3188	2092	713	993	846	652	983	186	3260	1231	63	1740	2229	0

1—Adelaide
2—Albany
3—Alice Springs
4—Auckland
5—Brisbane
6—Canberra
7—Christchurch
8—Darwin
9—Dunedin
10—Geelong
11—Hobart
12—Launceston
13—Melbourne
14—Mt. Gambier
15—Newcastle
16—Perth
17—Rockhampton
18—Sydney
19—Townsville
20—Wellington
21—Woollongong

SCORING TABLE

Distance (km)	52 MHz	144 MHz	420 MHz	576 MHz	Higher
50	1	1	2	5	10
50-100	2	2	5	10	25
100-150	5	5	15	30	50
150-300	10	10	25	50	100
300-500	25	15	50	150	250
500-800	20	25	100	250	300
800-1200	15	35	200	300	350
1200-2000	10	75	250	350	400
2000-4000	25	125	300	450	500
4000-6000	35	200	400	500	600
6000-9000	50	300	450	550	650
9000	100	400	500	600	700

EXAMPLE OF VK4 TRANSMITTING LOG

Date/ Time GMT	Band MHz	Emission	Call Sign	RST Sent	RST Recd.	Dist. km	Pts.
Dec. 24							
1402	52	A3(a)	VK7ZAB	56001	57022	1234	10
1424	52	A3(a)	VK4OP	57002	54004	330	25
1534	144	A3	VK5ZDL	58003	56043	980	35
1655	144	A3	VK3ZHD	45004	57089	175	10

EXAMPLE OF VK6 S.W.L. RECEIVING LOG

Date/ Time GMT	Band MHz	Call Heard	RST Sent	Station Called	Dist. km	Pts.
Jan.2						
1207	52	VK5ZXG	56087	VK8OK	1330	10
1400	52	VK2ZDD	56244	VK6DB	2450	25
1815	432	VK6JX	57061	VK6TG	60	5
22	144	VK5RF	47004	VK6ZDQ	1330	75

Hamads

FOR SALE

Spectrum Analyzer, Radio Corporation T.V. Type. Xtal locked front end. Ideal to use for 6 x 2 mx, $30. **Plessey B47** 36-54 MHz FM transceiver, going, in good cond., $45. **GEC High Band** repeater Tx and Rx units, 3/20 final, $60. **Cossor 1039** Dual Trace CRO, $80. John Day VK3ZJF, 12 Boston Ave., Carnegie, 3163.

Command Tx BC-458-A, in original state, 5.3 to 7.0 MHz, convertable to amateur band, $10. VK3BDN QTHR. Ph.: (03) 848 3959.

Teleprinter on matching metal table, V.G.C., $85. **Teletype** character and distortion test generator, $35. **S.T.C. High Band** transceiver, $20. VK3ZAO, QTHR. Ph.: (03) 96 4292.

2-FM MR-6 3/12 Final. Complete and in excellent condition. Comes with Xtals for Ch 1, 2, 4, B, and 50. $100.00 ONO. Ring Rod (03) 630 7947, AH: 232 9237.

3 only **Filter Condensers 2 MFD,** 3000 VW, $4 each. VK3ML, GPO Box 4533, Melb. Ph.: (03) 329 9633.

TCA Type 1674 6m FM, $20. **EAs 1966** —73, $5 posted per year, 40 yds **UR67 Coax,** 40c yd posted, **E[illegible]0 Metalwork,** Dial Drive, RF meter, $12. **"S[illegible] Constant** Volt Trans 350 VA, $75. **Zephyr** 300 Watt AM Tx (ex Royal Flying Doctor), offers. G. Algie, Box 1101, Mt. Isa 4825 Q. Ph.: (077) 43 4917.

Katsumi Electronic Keyer, brand new, $25. Eric Bierre VK2BEK. Ph.: (02) 358 3491 evenings.

Antenna Mast, Oregon 2" x 2", 50 ft. in two telescopic sections. Suitable VHF beams including guys, $20. **Pye 6m AM carphone,** tunable Rx 12V, $15. Self-contained **Geloso** 5 band VFO regulated PS, $20. **4 el 6 metre beam** coax feed, $10. VK4CCD (072) 38 2757 (Brisbane).

Trio TR2E 144-148 MHz transceiver with FET preamp. Internal speaker, good performer. 240 V AC and 12 V DC operation, $230. Also **Lafayette HA230** General Coverage Rx, 550 kHz to 30 MHz, $130. VK3ATR, 29 Flinders St., Keilor Park, 3303. Ph.: (03) 336 1054.

Tape Punch. 3 small desk top units, each incorporating an 8 level (ASCII) paper tape punch. A 24 level card reader. Power supply and control logic for above. Info to convert punch to reader if required. $35 each. VK5ZCP, QTHR. Ph.: (082) 223 2296.

Carphone AWA MR3 12V, Ch. 37, 42(R1), $40. **PS Unit,** complete with speaker in case, suits HF SSB transceivers, $40. VK3BR, QTHR. Ph.: (03) 878 4939.

Yaesu FTV-650 6m transverter, complete with connecting cables and manual. Good condition. What offers? Bob Martindale VK3BMA. Ph.: (03) 62 9465 (business hours only).

Rx Kingsley KCR/II (post war version of AR7), complete with all coil boxes and IF crystal, in carrying case, with power supply, $70. VK3ZJM, QTHR. Ph.: (059) 75 3139.

Collins S-Line 75S3 Rx, $485. **32S3 Tx** and **516 F2** PS, $525. Perfect order and cond., just overhauled by Collins. **75A4 Rx,** 160 mx-10 mx, four Collins filters, 500 Hz, 2.1 kHz, 3.1 kHz, 6 kHz, passband tuning, rejector tuning, noise limiter, professionally fitted with the recognised up-dating mods. (7360 mixers, 6GM6 RF, etc.) $485. VK3BM, QTHR. Box. No. Ph.: (050) 32 4102.

Ex Army Transceiver C4S, includes all cables, plugs, acc., 24 V power supply, aerial tuner and 100 ft. coax. Perfect cond., 23-38 MHz, $70. VK3ZJP, Flat 5/34 Gardenia St., Gardenvale.

High Band mobile, 25 W Courier FM 400/30, solid state transmitter, hybrid receiver, circuit, $60. VK3AOT, QTHR. Ph.: (03) 949 6612 (bus. hours).

FT101-B, still in original carton, new, never used. Ph.: (02) 525 6005 after 6 p.m.

Communications Rx, type R5223, 29 bands in 1 m Hz sweeps, covers. 55 MHz to 30 MHz, BFO, noise limiter, inbuilt PSU and speaker, similar in operation to the 51J series of Receivers, as new cond., complete with operators' manual, $260. **Creed Model** 7B Teleprinter in V.G., $60. W. Babb, VK3AQB. Ph.: (03) 337 4902.

Vintage Communications Receiver. Classic RME 69 in original order, working well. Suit amateur radio museum or historic collection. $100 ONO. VK3OM. Ph.: (03) 560 9215.

WANTED

BC 348, not working or partly wrecked, chassis for restoration purposes, or buy **BC348 Tuning** gang, xtal filter, tuning knob and dial escutcheon, controller for aircraft Rx type AD704. W. Babb VK3AQB. Ph.: (03) 337 4902.

Receiver Type 78 Schematic and conversion info. Pay postage and copying costs. Also wanted: **General Coverage Receiver** (550 kHz to 30 MHz minimum) in good condition. VK2ATJ/T. P.O. Box 45, Kensington, 2033.

DC200, 12 V PS for FT200 and cable harness plugs etc. VK8KG, QTHR. Ph.: Nhulunbuy 87 1427 A.H. or 87 1177, ext. 318.

Morse Keys, 20 plus years old, any condition wanted. Write details and price C. P. J. Crothers, 90 Kitchener Rd., Ascot, Brisbane, 4007.

Eddystone 940 EA1Z 770R. Price and details Ph.: (08) 382 5610 after 6 p.m. or 20 College Road, Kent Town, S.A., 5162.

20 Years Ago

with Ron Fisher VK3OM

OCTOBER 1954

"The oft repeated statement that the costly instruments demanded by the advances made in the electronic art in recent years have sounded the death knell of the Amateur Experimenter is based on a false concept". The Editorial Page of October 1954 Amateur Radio made the comment and continued:

"However the Amateur with his great enthusiasm and pioneering spirit can and will still be out in front searching for new worlds to conquer".

Some interesting statistics on the QSL habits of the Australian amateur are included in the annual report of the Federal QSL Manager. From a high of 73,000 cards in 1947, QSLing had declined each year to only 21,000 in 1953. Total cost of running the Bureau amounted to only $12.13.

The New Look in Frequency Modulation. John Miller VK2ANF described an exciter with switching for either phase or frequency modulation. The real start of amateur FM was still a few years off. The release of surplus commercial units around 1957 saw FM as we know it today come into being. In the series 'Complete Amateur', Tom Athey described the construction of a heterodyne frequency meter.

Silent Keys

Mr. J. C. A. YOUNG VK4OY
Mr. VINCENT HILL VK2SWL

Ionospheric Predictions

with Howard Rider, VK3ZJY October, 1974

This month's predictions from information supplied by the Ionospheric Prediction Service Division indicate point to point band openings for at least 50 per cent of the month.
Times quoted are GMT.

28 MHz				
VK2 to	JA			2300 - 0600
VK4 to	W6			2100 - 0100
	KH6			2100 - 0700
VK5 to	JA			2400 - 0600
VK6 to	JA			0100 - 0700
VK7 to	VK9			0200
21 MHz				
VK2 to	G(SP)			0900
	SU			0400 - 0900
	ZS			0500
	UA			0400 - 0900
	VK9			2100 - 0800
VK3 to	KH6			2000 - 0700
	G(SP)			0700 - 1000
	VE3(SP)			2100 - 2300
	VK9			2100 - 0900
	ZL			0200 - 0400
VK4 to	SU			0400 - 0900
	KH6			1900 - 0900
	VK0			0100 - 0800
	W1			2000 - 2400
VK5 to	JA			2200 - 1000
	UA			0400 - 1000
	W6			2100 - 0300
	ZS			0500 - 0600
VK6 to	G(SP)			0700 - 1200
	W6			2300 - 0300
	ZL			0400
VK7 to	JA			2200 - 0900
	9G1(LP)		2100 - 0200	0700 - 0800
	W1			2200 - 2400
14 MHz				
VK2 to	G(SP)			0800 - 1600
	KH6			0500 - 1300
	SU		1200 - 1600	2100 - 2300
	VK0			2000 - 1000
	W1			1300 - 1500
	ZL			2000 - 1000
VK3 to	JA		0600 - 1600	2100 - 2300
	VE3(SP)			1300 - 1500
	9G1(SP)			2300 - 0100
	VK9			2000 - 1600
	UA			0800 - 1600
	ZS			1200
VK4 to	W6	1600	1900	0400
	VK0		0300 - 1300	2000 - 2400
	ZS			1200 - 1300
	JA		0600 - 1800	2100 - 2200
VK5 to	KH6		0500 - 1300	2000
	PY		0700 - 1200	2100 - 0100
	9G1(SP)			2200 - 0100
	9G1(LP)			0700 - 1000
VK6 to	PY		0700 - 1100	2100 - 0300
	UA			1000 - 1700
	W1		1300 - 1700	2100 - 2300
	ZL			2200 - 1200
VK7 to	G(SP)			0900 - 1500
	SU		2100 - 2400	1200
	VK0			2000 - 1700
	W6		0400	1900
7 MHz				
VK2 to	G(SP)			1500 - 2000
	W6			0700 - 1500
VK3 to	JA			0900 - 2000
	9G1(SP)			1800 - 2100
VK4 to	VK0			0700 - 2100
	PY			0800 - 0900
VK5 to	KH6			1600 - 2100
	VE3(SP)			0800 - 1300
VK6 to	ZL			0900 - 1900
	SU			1500 - 2100
VK7 to	VK9			0800 - 2100
	UA			1300 - 2100

QSP

SUNSPOT CYCLE

"If our predictions are correct, high frequency propagation during the next six to eight years will be marginal. While weeks of solar quiesance will be punctuated by bursts of activity, only those lucky enough to be on the bands at the right time may reap the rewards. There is a way, however, to remove some of the chance in knowing when conditions are favourable for long-distance communications. By establishing immediately a network of world-wide beacon stations in the 10, 15 and 20 metre bands, operators can have continuous indications of propagation conditions over various paths. (The beacons could also be used to conduct comprehensive studies on ionospheric propagation — as a result of such studies we will perhaps learn how to use the HF bands more effectively during periods of sunspot minima)". So writes W4UMF and co-author Paul Lintz concluding an article entiled 'The Sunspot Cycle' in CQ for Mar. '74.

It's on again . . .

Sat. 2nd Nov. — Sun. 3rd Nov.

ANNUAL CONVENTION

of the

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PRICE: $198 INC. TAX
AND 3 CHANNELS
EXTRA CHANNELS $7.80/PR

Features
- ☐ Switchable Power 1 or 10 Watts
- ☐ 22 Channel Capability
- ☐ Adjustable Deviation
- ☐ Solid State T/R Relay
- ☐ Built-in Protection for P.A.
- ☐ DC Voltages Filtered and Regulated
- ☐ Complete with Mounting Bracket
- ☐ Microphone, Cables etc.
- ☐ Size 58 x 156 x 205 mm

ALL AVAILABLE EX STOCK with all accessories

IC 21A FM 144 MHz Mobile Base

PRICE: $285 INC. TAX
AND 3 CHANNELS
EXTRA CHANNELS $7.80/PR

Features
- ☐ Basic Features of IC 22 with addition of Built-in AC Power Unit
- ☐ DC Operation 13.5 V DC
- ☐ Disc. Meter + SWR Meter
- ☐ Switchable Deviation — Wide/Narrow
- ☐ VFO Operation Possible
- ☐ Continuously Variable Power Output
- ☐ Built-in Calibration
- ☐ Size 111 x 230 x 260 mm

AVAILABLE EX STOCK

IC 501 CW SSB AM 50 MHz Transceiver

PRICE: $428 INC. TAX

Features
- ☐ Phase Lock Loop VFO
- ☐ Covers 50 - 54 MHz
- ☐ 10 Watts PEP SSB
- ☐ Xtal Filters for AM/CW
- ☐ Xtal Channel Operation
- ☐ AC or DC Operation
- ☐ Size 260 x 230 x 111 mm

ALSO AVAILABLE

IC 60	6 METER MOBILE	$220
IC 31	420 - 450 MHz	$378
IC 30	420 - 450 MHz	$328

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